

STIC Database Tracking Number

To: GREGORY LISTVOYB
Location: REM-10D60
Art Unit: 1796
Wednesday, December 19, 2007
Phone: (571) 272-6105
Case Serial Number: 10 / 560861

From: JAN DELAVAL
Location: EIC1700
REM-4B28 / REM-4A30
Phone: (571) 272-2504

jan.delaval@uspto.gov

Search Notes

1-7

Anekwe, Imelda (ASRC)

046053

From: GREGORY LISTVOYB [gregory.listvoyb@uspto.gov]
Sent: Monday, December 17, 2007 12:47 PM
To: STIC-EIC1700
Subject: Database Search Request, Serial Number: 10/560861

Requester: GREGORY LISTVOYB (P/1796)
Art Unit: GROUP ART UNIT 1796
Employee Number: 83146
Office Location: REM 10A61
Phone Number: (571)272-6105
Mailbox Number: RA61

Case serial number: 10/560861
Class / Subclass(es):
Earliest Priority Filing Date:
Format preferred for results: Paper
Attachments: No attachment.
Search Topic Information:

Claims 1-7
Special Instructions and Other Comments:

TO: PATENT RESEARCH
STIC-EIC1700
Pat. & T.M. Office

DEC 17 -

Pat. & T.M. Office

Jan
Milton

12/17/2007



STIC Search Results Feedback Form

EIC17000

Questions about the scope or the results of the search? Contact the EIC searcher or contact:

Kathleen Fuller, EIC 1700 Team Leader
5711272-2505 REMSEN 4B28

Voluntary Results Feedback Form

- I am an examiner in Workgroup: Example: 1713
- Relevant prior art found, search results used as follows

- ☐ 102 rejection
- ☐ 103 rejection
- ☐ Cited as being of interest.
- ☐ Helped examiner better understand the invention.
- ☐ Helped examiner better understand the state of the art in their technology.

Types of relevant prior art found:

- ☐ Foreign Patent(s)
- ☐ Non-Patent Literature
(journal articles, conference proceedings, new product announcements etc.)

- Relevant prior art not found:

- ☐ Results verified the lack of relevant prior art (helped determine patentability)
- ☐ Results were not useful in determining patentability or understanding the invention.

Comments:

=> fil reg

FILE 'REGISTRY' ENTERED AT 08:10:04 ON 19 DEC 2007

USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.

PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

COPYRIGHT (C) 2007 American Chemical Society (ACS)

Property values tagged with IC are from the ZIC/VINITI data file provided by InfoChem.

STRUCTURE FILE UPDATES: 18 DEC 2007 HIGHEST RN 958693-84-0

DICTIONARY FILE UPDATES: 18 DEC 2007 HIGHEST RN 958693-84-0

New CAS Information Use Policies, enter HELP USAGETERMS for details.

TSCA INFORMATION NOW CURRENT THROUGH June 29, 2007

Please note that search-term pricing does apply when conducting SmartSELECT searches.

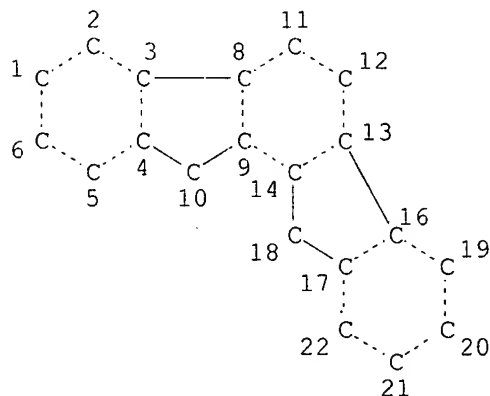
REGISTRY includes numerically searchable data for experimental and predicted properties as well as tags indicating availability of experimental property data in the original document. For information on property searching in REGISTRY, refer to:

<http://www.cas.org/support/stngen/stndoc/properties.html>

=> d sta que l19

L17

STR



NODE ATTRIBUTES:

DEFAULT MLEVEL IS ATOM

DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:

RING(S) ARE ISOLATED OR EMBEDDED

NUMBER OF NODES IS 20

STEREO ATTRIBUTES: NONE

L19 120 SEA FILE=REGISTRY SSS FUL .L17

100.0% PROCESSED 22911 ITERATIONS

120 ANSWERS

SEARCH TIME: 00.00.01

=> d his

(FILE 'HOME' ENTERED AT 07:24:36 ON 19 DEC 2007)
SET COST OFF

FILE 'HCAPLUS' ENTERED AT 07:24:44 ON 19 DEC 2007

L1 1 S US20060149016/PN OR (US2006-560861# OR EP2003-14042)/AP,PRN N
E ODELL/AU
E ODELL R/AU
L2 18 S E3-E5,E8
E O DELL R/AU
L3 65 S E3-E9,E12,E13
E O DELL/AU
E POUNDS/AU
E POUNDS T/AU
L4 16 S E4-E10
E WALLACE/AU
L5 4 S E3
E WALLACE P/AU
L6 375 S E3-E15,E30-E42
E TOWNS/AU
L7 53 S E19-E23
E MCKIERNAN/AU
L8 28 S E35-E37,E42-E44
E MC KIERAN/AU
L9 1 S E7
E COVION/CO
L10 101 S E4-E6
L11 83 S E4-E6/PA,CS
E E4+ALL
E E1+ALL
L12 34924 S E2+RN OR E2-E75/PAMCS OR MERCK?/CO,PA,CS
E COVION/PA,CS
L13 101 S E3-E20
SEL RN L1

FILE 'REGISTRY' ENTERED AT 07:29:26 ON 19 DEC 2007

L14 11 S E1-E11
L15 3 S L14 AND NR>=5
E 6952/RID
L16 37 S E6
L17 STR
L18 9 S L17
L19 120 S L17 FUL
SAV TEMP L19 LISTVOYB560/A
L20 120 S L15,L16,L19

FILE 'HCAOLD' ENTERED AT 07:32:51 ON 19 DEC 2007

L21 12 S L20

FILE 'HCAPLUS' ENTERED AT 07:33:17 ON 19 DEC 2007

L22 98 S L20
L23 78 S L22 AND PY<=2003 NOT P/DT
L24 11 S L22 AND (PD<=20030623 OR PRD<=20030623 OR AD<=20030623) AND P
L25 89 S L23,L24
L26 1 S L1-L13 AND L25
E CONDUCTING POLYMERS/CT
L27 15526 S E3-E8
E E3+ALL
L28 18961 S E5,E6

L29 1 S L25 AND L27, L28
 E SEMICONDUCTOR DEVICES/CT
 L30 120106 S E3-E45
 L31 672291 S E50+OLD, NT OR E56+OLD, NT OR E59+OLD, NT OR E62+OLD, NT OR E73+O
 E E3+ALL
 L32 429208 S E7+NT
 E E6+ALL
 L33 464207 S E3+OLD, NT OR E79+OLD, NT
 E SEMICONDUCT/CT
 L34 1076 S E38+OLD, NT
 L35 1 S E40
 E E41+ALL
 L36 94798 S E2
 L37 3 S L25 AND L30-L36
 E SOLAR CELLS/CT
 L38 21692 S E3-E8
 E E3+ALL
 L39 43702 S E13+OLD, NT
 E PHOTOELECTRIC DEVICES/CT
 L40 34442 S E3-E30
 E E3+ALL
 L41 71142 S E5+OLD, NT
 E E26+ALL
 L42 31475 S E10+NT
 E ELECTROLUMINESCE/CT
 L43 13417 S E4-E6 OR E4+OLD, NT
 L44 62416 S E10-E21 OR E10+OLD, NT
 E E4+ALL
 L45 13417 S E8+OLD
 L46 278188 S E7+OLD, NT OR E15+OLD, NT OR E17+OLD, NT
 E E16+ALL
 L47 62416 S E18+OLD
 L48 8 S L25 AND L38-L47
 L49 4 S L25 AND ?LUMINESC?
 L50 4 S L25 AND H01L/IPC, IC, ICM, ICS
 L51 2 S L25 AND C09K011/IPC, IC, ICM, ICS
 L52 3 S L25 AND H05B033/IPC, IC, ICM, ICS
 L53 2 S L25 AND C08G061-02/IPC, IC, ICM, ICS
 L54 1 S L25 AND C08F/IPC, IC, ICM, ICS
 L55 9 S L26, L29, L37, L48-L54
 E PHOSPHOR/CT
 L56 0 S L25 AND E3
 L57 2 S L25 AND (E33+OLD, NT OR E36+OLD, NT OR E43+OLD, NT)
 E PHOSPHORS/CT
 L58 1 S L25 AND E3-E15
 E E3+ALL
 L59 1 S L25 AND E4+NT
 L60 9 S L55-L59
 L61 16 S L25 AND ?POLYM?
 L62 7 S L25 AND (POLYM? OR PLASTIC?)/SC, SX, CW, CT
 L63 4 S L25 AND ?PLASTIC?
 L64 24 S L60-L63
 L65 2 S L24 NOT L64
 L66 26 S L64, L65
 SEL HIT RN

FILE 'REGISTRY' ENTERED AT 07:54:23 ON 19 DEC 2007

L67 58 S E1-E58
 L68 22 S L67 AND (C20H1002 OR C32H20BR2 OR C20H10N4 OR C20H12O OR C24H
 L69 62 S L20 NOT L67

L70 14 S L69 AND L15,L16
L71 48 S L69 NOT L70
L72 1 S L71 AND C22H14
L73 37 S L68,L70,L72

FILE 'HCAPLUS' ENTERED AT 08:03:04 ON 19 DEC 2007

L74 22 S L73
L75 19 S L74 AND PY<=2003 NOT P/DT
L76 1 S L73 AND (PD<=20030623 OR PRD<=20030623 OR AD<=20030623) AND P
L77 20 S L75,L76
L78 5 S L77 AND ?POLYM?
L79 3 S L77 AND (POLYM? OR PLASTIC?)/SC,SX,CW,CT
L80 0 S L77 AND ?PLASTIC?
L81 1 S L77 AND ?LUMINESC?
L82 1 S L77 AND (SEMICONDUCT? OR SEMI CONDUCT?)
L83 1 S L77 AND (C08F OR H01L OR C09K011 OR H05B033 OR C08G061)/IPC,I
L84 3 S L77 AND L27,L28,L30-L36,L38-L47
L85 1 S L77 AND L1-L13
L86 7 S L78-L85,L76
E ELECTRIC CONDUCTIVITY/CT
L87 150461 S E3-E32
L88 80890 S E33-E66
E E3+ALL
L89 227304 S E6+OLD,NT
L90 355779 S E54+OLD,NT OR E55+OLD,NT OR E56+OLD,NT OR E57+OLD,NT
L91 1 S L77 AND L87-L90
L92 7 S L86,L91
L93 3 S L77 AND ELECTR?/SC,SX
L94 7 S L92,L93
L95 13 S L77 NOT L94
L96 20 S L94,L95

FILE 'REGISTRY' ENTERED AT 08:10:04 ON 19 DEC 2007

=> fil hcaplus

FILE 'HCAPLUS' ENTERED AT 08:10:15 ON 19 DEC 2007

USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.

PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

COPYRIGHT (C) 2007 AMERICAN CHEMICAL SOCIETY (ACS)

Copyright of the articles to which records in this database refer is held by the publishers listed in the PUBLISHER (PB) field (available for records published or updated in Chemical Abstracts after December 26, 1996), unless otherwise indicated in the original publications. The CA Lexicon is the copyrighted intellectual property of the the American Chemical Society and is provided to assist you in searching databases on STN. Any dissemination, distribution, copying, or storing of this information, without the prior written consent of CAS, is strictly prohibited.

FILE COVERS 1907 - 19 Dec 2007 VOL 147 ISS 26

FILE LAST UPDATED: 18 Dec 2007 (20071218/ED)

New CAS Information Use Policies, enter HELP USAGETERMS for details.

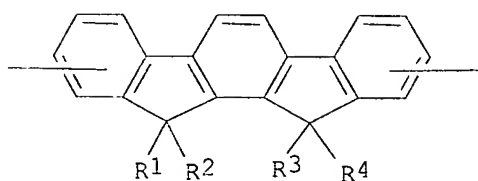
This file contains CAS Registry Numbers for easy and accurate substance identification.

=> d 196 bib abs hitind hitstr retable tot

L96 ANSWER 1 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN
 AN 2004:1154360 HCAPLUS
 DN 142:75323
 TI Production of **semiconductive** oligomers and **polymers**
 for use in thin film electronic and optical devices
 PA **Covion Organic Semiconductors GmbH, Germany**
 SO Eur. Pat. Appl., 26 pp.
 CODEN: EPXXDW
 DT **Patent**
 LA English
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1491568	A1	20041229	EP 2003-14042	20030623 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
	WO 2004113412	A2	20041229	WO 2004-EP6721	20040622 <--
	WO 2004113412	A3	20050421		
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	EP 1639027	A2	20060329	EP 2004-740151	20040622 <--
	R: DE, FR, GB, NL				
	CN 1768090	A	20060503	CN 2004-80008666	20040622 <--
	US 2006149016	A1	20060706	US 2005-560861	20051215 <--
PRAI	EP 2003-14042	A	20030623	<--	
	WO 2004-EP6721	W	20040622		

GI



I

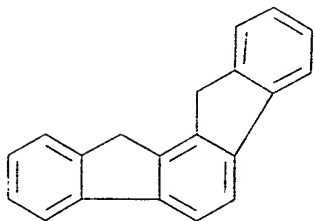
AB The present invention relates to new **semiconductive** oligomers and **polymers** (I), a process for their manufacture and their use in thin film electronic and optical devices, such as organic light emitting diodes (OLED) and photovoltaic devices, eg. solar cells and photodetectors; wherein R1, R2, R3, R4, which may be the same or different, are independently selected from hydrogen or a substituent and two or more of R1, R2, R3, and R4 may be linked to form a ring.

IC ICM C08G0061-02
 ICS C07C0025-22; H01L0051-30; C07C0001-20; C07C0001-24

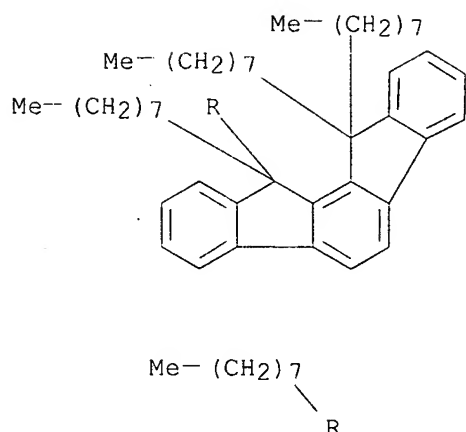
CC 37-3 (Plastics Manufacture and Processing)
 Section cross-reference(s): 52, 73

ST **semiconductive oligomer polymer** thin film electronic

- optical device
- IT **Conducting polymers**
(polythiophenes; production of **semiconductive** oligomers and **polymers** for use in thin film electronic and optical devices)
- IT **Conducting polymers**
Electroluminescent devices
Optical detectors
Photoelectric devices
Semiconductor devices
Solar cells
(production of **semiconductive** oligomers and **polymers** for use in thin film electronic and optical devices)
- IT 1169-58-0P **5815-59-8P** 27609-80-9P, [1,1':4',1''-Terphenyl]-2',3'-dimethanol 49538-77-4P **815588-68-2P**
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(intermediate; production of **semiconductive** oligomers and **polymers** for use in thin film electronic and optical devices)
- IT **815588-69-3P**
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(monomer; production of **semiconductive** oligomers and **polymers** for use in thin film electronic and optical devices)
- IT 126213-51-2, Polyethylene dioxythiophene
RL: TEM (Technical or engineered material use); USES (Uses)
(production of **semiconductive** oligomers and **polymers** for use in thin film electronic and optical devices)
- IT 111-83-1, Octyl bromide 762-42-5, Dimethylacetylenedicarboxylate 886-65-7, 1,4-Diphenyl-1,3-butadiene 7726-95-6, Bromine, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(starting material; production of **semiconductive** oligomers and **polymers** for use in thin film electronic and optical devices)
- IT **5815-59-8P 815588-68-2P**
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(intermediate; production of **semiconductive** oligomers and **polymers** for use in thin film electronic and optical devices)
- RN 5815-59-8 HCAPLUS
- CN Indeno[2,1-a]fluorene, 11,12-dihydro- (CA INDEX NAME)



- RN 815588-68-2 HCAPLUS
- CN Indeno[2,1-a]fluorene, 11,12-dihydro-11,11,12,12-tetraoctyl- (9CI) (CA INDEX NAME)



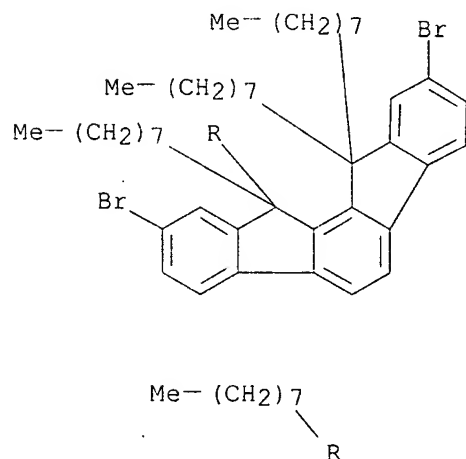
IT 815588-69-3P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

(monomer; production of **semiconductive** oligomers and **polymers** for use in thin film electronic and optical devices)

RN 815588-69-3 HCAPLUS

CN Indeno[2,1-a]fluorene, 2,9-dibromo-11,12-dihydro-11,11,12,12-tetraoctyl-(9CI) (CA INDEX NAME)



RETABLE

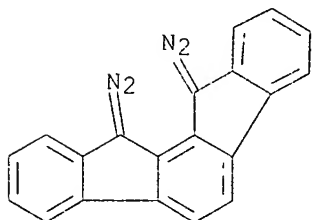
Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Harvey, R	2000	165	3952	JOURNAL OF ORGANIC C	
Kreuder, W	2000			WO 0022026 A	HCAPLUS
Mullen, K	2000	133	2016	MACROMOLECULES	
Plummer, B	1993	115	11542	JOURNAL OF THE AMERI	HCAPLUS
Robert, T	2000			WO 0053656 A	HCAPLUS
Stepanovich, D	1976			CH 582115 A	

L96 ANSWER 2 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN

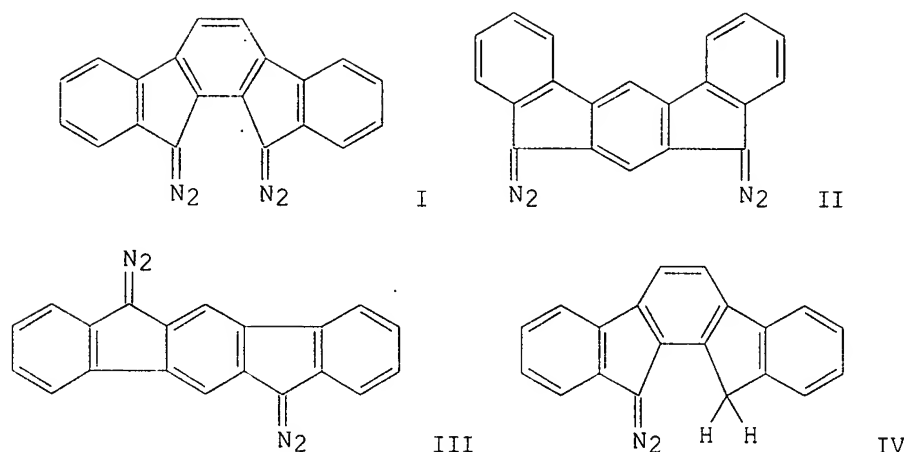
AN 1991:419108 HCAPLUS

DN 115:19108

TI Structure of 11,12-bis(diazo)-11,12-dihydroindeno[2,1-a]fluorene
AU Miyazaki, Akira; Izuoka, Akira; Sugawara, Tadashi; Bethell, Donald;
Gallagher, Peter
CS Coll. Arts Sci., Univ. Tokyo, Tokyo, 153, Japan
SO Acta Crystallographica, Section C: Crystal Structure Communications (1991), C47(5), 1054-6
CODEN: ACSCEE; ISSN: 0108-2701
DT Journal
LA English
AB The title compound is orthorhombic, space group Pbcn, with a 14.53(2), b 10.007(9), and c 20.033(4) Å; d.(calculated) = 1.397 for Z = 8. Final R = 0.059 for 1259 reflections. Atomic coordinates are given. The indenofluorene ring is planar and considerable distortion of bond angles and bond lengths is observed in the 2 closely located diazo groups. In the crystal structure, pairs of mols. with antiparallel orientations form a herringbone packing pattern, commonly observed in polycondensed aromatic hydrocarbons.
CC 75-8 (Crystallography and Liquid Crystals)
Section cross-reference(s): 25
IT 92265-85-5
RL: PRP (Properties)
(crystal structure of)
IT 92265-85-5
RL: PRP (Properties)
(crystal structure of)
RN 92265-85-5 HCAPLUS
CN Indeno[2,1-a]fluorene, 11,12-bis(diazo)-11,12-dihydro- (9CI) (CA INDEX NAME)



L96 ANSWER 3 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 1990:97954 HCAPLUS
DN 112:97954
TI Cathodic oligomerization of bis(diazo) compounds of the indenofluorene series. Part 2. Kinetics and mechanistic aspects
AU Bethell, Donald; Gallagher, Peter; Self, David P.; Parker, Vernon D.
CS Dep. Chem., Univ. Liverpool, Liverpool, L69 3BX, UK
SO Journal of the Chemical Society, Perkin Transactions 2: Physical Organic Chemistry (1972-1999) (1989), (8), 1105-9
CODEN: JCPKBH; ISSN: 0300-9580
DT Journal
LA English
OS CASREACT 112:97954
GI



AB The time dependence of the disappearance of diazo groups in bis(diazo)indeno[1,2-b]fluorenes I and II during constant-current electrolysis in DMF at a Pt cathode, giving oligomeric polyazines, was examined. The form of the diazo-group concentration-vs.-time curves shows that chain reactions are involved, and the slopes place limits on the chain lengths. Interrupting the current after partial reaction of I showed, by an adaptation of methodol. previously developed to explain the electrochem. reduction of 9-diazo[1,2-b]fluorene, that the chain-termination process is 1st order in the chain carrier; kinetic parameters for the propagation and termination processes in homogeneous solution were obtained. The discrepancy between the observed concentration/time curve for continuous electrolysis and that calculated from

these kinetics parameters gives information on the initiation step, indicating a chain carrier formed from 4 monomer units. Similarly, the results for II best fit a reaction scheme involving, in the early stages, a trimeric chain carrier which is partitioned between chain transfer to monomer and termination by dimerization. Details of these processes are discussed, and the way in which the mechanistic schemes permit interpretation of the differing mol.-weight distributions in the final products from I and II are explained. Supporting evidence is provided by thermolytic studies of I-III in solution and voltammetric expts. on the related monodiazo compound IV.

CC 22-13 (Physical Organic Chemistry)

Section cross-reference(s): 35, 72

IT Kinetics of **polymerization**

(oligomerization, electrochem., of bis(diazo)indeno[1,2-b]fluorenes)

IT **Polymerization**

(oligomerization, electrochem., of bis(diazo)indeno[1,2-b]fluorenes, mechanism of)

IT 92265-85-5

RL: RCT (Reactant); RACT (Reactant or reagent)

(electrochem. oligomerization of, kinetics and mechanism of, and thermal decomposition of, kinetics of, and photolysis of)

IT 123728-99-4

RL: RCT (Reactant); RACT (Reactant or reagent)

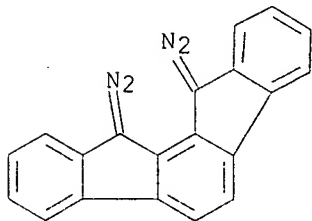
(electrochem. reduction of, kinetics and mechanism of)

IT 92265-85-5

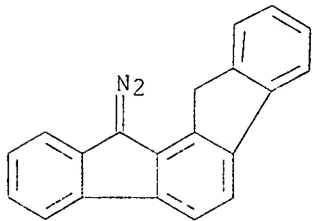
RL: RCT (Reactant); RACT (Reactant or reagent)

(electrochem. oligomerization of, kinetics and mechanism of, and thermal decomposition of, kinetics of, and photolysis of)

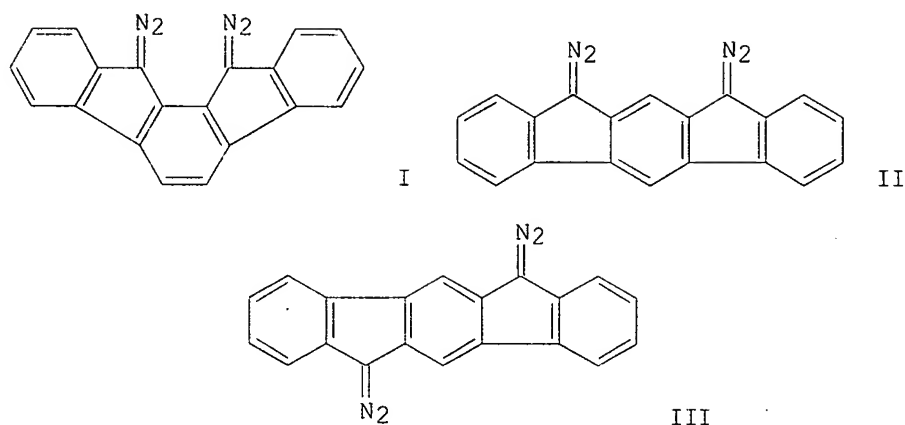
RN 92265-85-5 HCAPLUS
CN Indeno[2,1-a]fluorene, 11,12-bis(diazo)-11,12-dihydro- (9CI) (CA INDEX NAME)



IT 123728-99-4
RL: RCT (Reactant); RACT (Reactant or reagent)
(electrochem. reduction of, kinetics and mechanism of)
RN 123728-99-4 HCAPLUS
CN Indeno[2,1-a]fluorene, 11-diazo-11,12-dihydro- (9CI) (CA INDEX NAME)



L96 ANSWER 4 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 1989:615018 HCAPLUS
DN 111:215018
TI Cathodic oligomerization of bis(diazo) compounds of the indenofluorene series. Part I. General features
AU Bethell, Donald; Gallagher, Peter; Bott, David C.
CS Robert Robinson Lab., Univ. Liverpool, Liverpool, L69 3BX, UK
SO Journal of the Chemical Society, Perkin Transactions 2: Physical Organic Chemistry (1972-1999) (1989), (8), 1097-104
CODEN: JCPKBH; ISSN: 0300-9580
DT Journal
LA English
GI



- AB Three bis(diazo) compds. of the indenofluorene series (I, II, and III) were prepared and decomposed by an electrochem. initiated chain process in DMF solution. The black solns. so obtained show single-line ESR spectra and electronic absorption spectra extending into the near IR region of the spectrum. In situ electrochem. ESR spectra of electrolyzed solns. of I and II in CH₃CN are similar to spectra reported for lightly doped conjugated **polymers**. Chemical evidence is presented to show that the products are polyazines and the results of elemental and gel permeation chromatog. anal. suggest ds.p. in the range 2-5 for I and .apprx.17 for II and III; although in the latter instances there is evidence for material of much greater mol. weight. The black solid materials isolated from the electrolysis solns. and containing supporting electrolyte (Me₄NBF₄) show specific conductivities of ca. 10⁻¹⁰ (1b), 10⁻⁹ (2b), and 10⁻⁶ (3b) ohm⁻¹ cm⁻¹, all increasing to 10⁻⁴-10⁻³ on exposure to gaseous SO₃.
- CC 35-5 (Chemistry of Synthetic High **Polymers**)
Section cross-reference(s): 36, 72
- IT **Electric conductivity and conduction**
(of indenofluorene bis(diazo) oligomers, sulfur trioxide doping effect on)
- IT **Polymerization**
(oligomerization, electrochem., of indenofluorene bis(diazo) compds.)
- IT **Polymers, preparation**
(polyketazines, oligomers, preparation of, in cathodic oligomerization of bis(diazo) compds. of indenofluorenes)
- IT **123661-41-6P 123661-43-8P 123661-44-9P**
RL: SPN (Synthetic preparation); PREP (Preparation)
(oligomeric, preparation and characterization of)
- IT **92265-85-5P 102150-04-9P 123661-42-7P**
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(preparation and cathodic oligomerization of)
- IT **123728-94-9P 123728-95-0P 123728-96-1P**
123728-97-2P 123728-98-3P 123728-99-4P
RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation of)
- IT **3074-14-4, Indeno[2,1-a]fluorene-11,12-dione 5695-13-6,**
Indeno[1,2-b]fluorene-6,12-dione 112865-17-5, Indeno[2,1-b]fluorene-
10,12-dione
RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction of, with hydrazine hydrate)

IT 123661-41-6P

RL: SPN (Synthetic preparation); PREP (Preparation)
(oligomeric, preparation and characterization of)

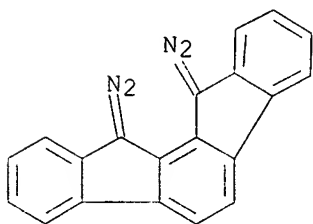
RN 123661-41-6 HCAPLUS

CN Indeno[2,1-a]fluorene, 11,12-bis(diazo)-11,12-dihydro-, homopolymer (9CI)
(CA INDEX NAME)

CM 1

CRN 92265-85-5

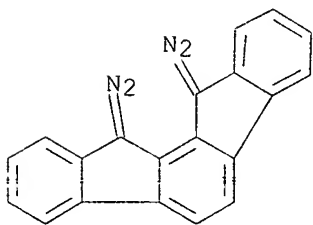
CMF C20 H10 N4



IT 92265-85-5P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT
(Reactant or reagent)
(preparation and cathodic oligomerization of)

RN 92265-85-5 HCAPLUS

CN Indeno[2,1-a]fluorene, 11,12-bis(diazo)-11,12-dihydro- (9CI) (CA INDEX
NAME)

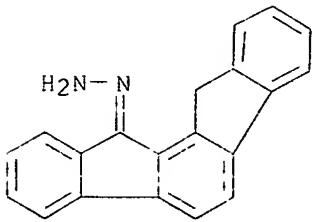
IT 123728-94-9P 123728-95-0P 123728-96-1P

123728-97-2P 123728-99-4P

RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation of)

RN 123728-94-9 HCAPLUS

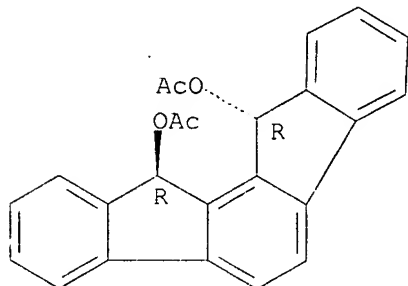
CN Indeno[2,1-a]fluoren-11(12H)-one, hydrazone (CA INDEX NAME)



RN 123728-95-0 HCAPLUS

CN Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-, diacetate, trans- (9CI)
(CA INDEX NAME)

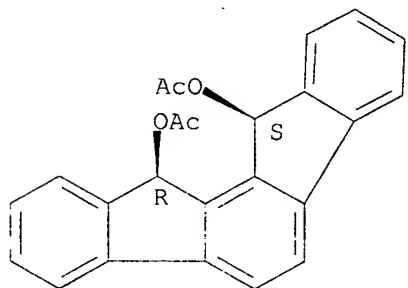
Relative stereochemistry.



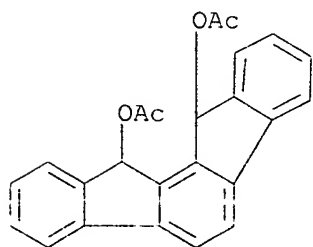
RN 123728-96-1 HCAPLUS

CN Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-, diacetate, cis- (9CI)
(CA INDEX NAME)

Relative stereochemistry.

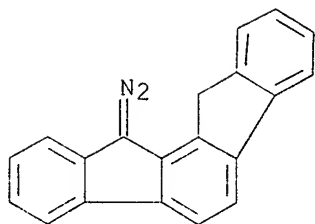


RN 123728-97-2 HCAPLUS

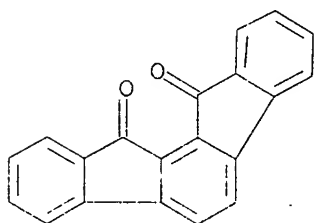
CN Indeno[2,1-b]fluorene-10,12-diol, 10,12-dihydro-, diacetate (9CI) (CA
INDEX NAME)

RN 123728-99-4 HCAPLUS

CN Indeno[2,1-a]fluorene, 11-diazo-11,12-dihydro- (9CI) (CA INDEX NAME)



IT 3074-14-4, Indeno[2,1-a]fluorene-11,12-dione
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (reaction of, with hydrazine hydrate)
 RN 3074-14-4 HCAPLUS
 CN Indeno[2,1-a]fluorene-11,12-dione (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



L96 ANSWER 5 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN
 AN 1989:94360 HCAPLUS
 Correction of: 1988:509706
 DN 110:94360
 Correction of: 109:109706
 TI Triplet-triplet absorption spectra of organic molecules in condensed phases.
 AU Carmichael, Ian; Hug, Gordon L.
 CS Radiat. Chem. Data Cent., Univ. Notre Dame, Notre Dame, IN, 46556, USA
 SO Journal of Physical and Chemical Reference Data (1986), 15(1), 1-250
 CODEN: JPCRBV; ISSN: 0047-2689
 DT Journal
 LA English
 AB A review in which a compilation is given of spectral parameters associated with triplet-triplet absorption of organic mols. in condensed media. The wavelengths of maximum absorbance and the corresponding extinction coeffs., where known, were critically evaluated. Other data, for example, lifetimes, energies, and energy transfer rates, relevant to the triplet states of these mols., are included by way of comments, but have not been subjected to a similar scrutiny. An introduction is given to triplet state processes in solution and solids, developing the conceptual background and offering a historical perspective on the detection and measurement of triplet state absorption. Techniques employed to populate the triplet state are reviewed and the various approaches to the estimation of the extinction coefficient of triplet-triplet absorption are discussed. A statistical anal. of the available data is presented and recommendations for a hierarchical choice of extinction coeffs. are made. Data collection is expected to be complete through the end of 1984.
 CC 22-9 (Physical Organic Chemistry)
 IT 19840-99-4 20073-24-9 20139-92-8 20266-41-5 20266-45-9

20272-93-9	20669-52-7	20910-35-4	21039-44-1	21339-55-9
21850-35-1	21861-70-1	22021-59-6	22082-92-4	22362-86-3
22362-94-3	22422-70-4	22559-70-2	22559-71-3	22559-72-4
22568-06-5	22970-73-6	22970-75-8	23284-44-8	23489-88-5
23648-06-8	23664-24-6	23802-37-1	23802-40-6	23807-28-5
23974-79-0	24315-14-8	24437-04-5	24513-48-2	24552-22-5
24804-00-0	24934-47-2	25514-96-9	25529-00-4	25565-22-4
25579-64-0	25668-24-0	25721-22-6	25767-20-8	25777-43-9
25794-80-3	25862-85-5	25952-50-5	26021-20-5	26034-43-5
26034-88-8	26071-73-8	26071-74-9	26483-78-3	26754-93-8
26929-86-2	27224-10-8	27876-94-4, 8,8'-Diapo- ψ,ψ -carotenedioic acid	28358-65-8	28406-56-6
29571-17-3	29620-00-6	30265-05-5	30342-23-5	31053-73-3
31083-73-5	31589-99-8	31700-39-7, 4-Pyrenol	31702-08-6	31702-14-4
32287-37-9	32719-43-0	32796-32-0	33486-98-5	33574-11-7
34160-17-3	34255-08-8	34439-72-0	34749-75-2, Acridine-d9	34777-33-8, 1H-Benzo[c]carbazole
34777-33-8, 1H-Benzo[c]carbazole	34880-57-4	35066-65-0	35139-10-7	35391-47-0
34879-84-0	35737-86-1	35983-73-4	36005-89-7	36749-63-0
35473-63-3	37414-11-2	37414-13-4	37432-21-6	38023-62-0
36919-44-5	38321-61-8	38399-10-9	38474-09-8	38579-27-0
38321-60-7	39139-76-9	39174-47-5	39581-33-4	39612-13-0
38673-65-3	39666-29-0	39758-70-8	39922-13-9	40358-51-8
39648-58-3	40867-32-1	40882-83-5	40904-90-3	40933-02-6
40603-58-5	41137-17-1	41346-16-1	42409-78-9	42917-63-5
41137-16-0	43099-12-3	47077-27-0	47079-56-1	47367-75-9
43099-11-2	47837-61-6	49631-45-0	50438-79-4	50438-83-0
47604-22-8	51038-75-6	51674-11-4	51804-54-7	51822-55-0
50849-31-5	52612-80-3	52647-48-0	52754-39-9	52761-70-3
51847-39-3	52806-22-1	52952-31-5, 29H,31H-Tetrabenzo[b,g,l,q]porphine	53172-84-2	53402-96-3
52776-50-8	53402-96-3	53402-97-4	53693-66-6	53693-67-7
53172-84-2	53693-69-9	53871-98-0	53871-99-1	53971-38-3
53693-68-8	54226-17-4	55488-88-5	55539-00-9	56013-12-8
54226-17-4	56053-76-0	56085-53-1	56456-42-9	56503-30-1
56053-76-0	56812-43-2	57193-97-2	57703-33-0	57704-78-6
56812-43-2	58195-37-2	58270-06-7	58303-26-7	58384-89-7
58195-37-2	59219-37-3	59405-22-0	59443-09-3	59543-47-4
59219-37-3	59671-36-2	59728-89-1	59728-91-5	59729-16-7
59671-36-2	59957-91-4	60090-85-9	60165-20-0	60171-74-6
59957-91-4	60247-34-9	60884-74-4	60920-21-0	61135-78-2
60247-34-9	61391-15-9	61391-16-0	61391-17-1	61556-11-4
61391-15-9	61905-36-0	61905-37-1	62107-60-2	62399-34-2
61905-36-0	62635-39-6	62888-19-1	63285-04-1	63376-81-8
62635-39-6	63376-99-8	63415-60-1	63697-27-8	63822-42-4
63376-99-8	64140-99-4	64358-50-5	65289-39-6	65289-40-9
64140-99-4	65817-53-0	66277-99-4	66399-06-2	66486-77-9
65817-53-0	66671-26-9	66933-94-6	66933-95-7	66933-96-8
66671-26-9	67168-90-5	67526-83-4, Benzophenazine	67567-20-8	67588-46-9
67168-90-5	67605-76-9	67777-65-5	68243-21-0	
67605-76-9				

RL: PRP (Properties)

(triplet-triplet absorption spectrum of)

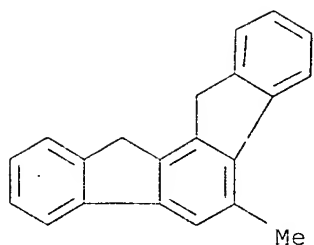
IT 38023-62-0

RL: PRP (Properties)

(triplet-triplet absorption spectrum of)

RN 38023-62-0 HCAPLUS

CN Indeno[2,1-a]fluorene, 11,12-dihydro-5-methyl- (CA INDEX NAME)



L96 ANSWER 6 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1988:509706 HCAPLUS

Correction of: 1986:552243

DN 109:109706

Correction of: 105:152243

TI Triplet-triplet absorption spectra of organic molecules in condensed phases

AU Carmichael, Ian; Hug, Gordon L.

CS Radiat. Chem. Data Cent., Univ. Notre Dame, Notre Dame, IN, 46556, USA

SO Journal of Physical and Chemical Reference Data (1986), 15(1), 1-250

CODEN: JPCRBV; ISSN: 0047-2689

DT Journal; General Review

LA English

AB A review in which a compilation is given of spectral parameters associated with triplet-triplet absorption of organic mols. in condensed media. Other data, for example, lifetimes, energies and energy transfer rates, relevant to the triplet states of these mols., are included by way of comments, but have not been subjected to a similar scrutiny. An introduction is given to triplet state processes in solution and solids, developing the conceptual background and offering an historical perspective on the detection and measurement of triplet state absorption. Techniques employed to populate the triplet state are reviewed and the various approaches to the estimation of the extinction coefficient of triplet-triplet absorption are discussed. A statistical anal. of the available data is presented and recommendations for a hierarchical choice of extinction coeffs. are made. Data collection is expected to be complete through the end of 1984.

CC 22-9 (Physical Organic Chemistry)

IT	19840-99-4	20073-24-9	20139-92-8	20266-41-5	20266-45-9
	20272-93-9	20669-52-7	20910-35-4	21039-44-1	21339-55-9
	21850-35-1	21861-70-1	22021-59-6	22082-92-4	22362-86-3
	22362-94-3	22422-70-4	22559-70-2	22559-71-3	22559-72-4
	22568-06-5	22970-73-6	22970-75-8	23284-44-8	23489-88-5
	23648-06-8	23664-24-6	23802-37-1	23802-40-6	23807-28-5
	23974-79-0	24315-14-8	24437-04-5	24513-48-2	24552-22-5
	24804-00-0	24934-47-2	25514-96-9	25529-00-4	25565-22-4
	25579-64-0	25668-24-0	25721-22-6	25767-20-8	25777-43-9
	25794-80-3	25862-85-5	25952-50-5	26021-20-5	26034-43-5
	26034-88-8	26071-73-8	26071-74-9	26483-78-3	26754-93-8
	26929-86-2	27224-10-8	27876-94-4	8,8'-Diapo- ψ,ψ -carotenedioic acid	28358-65-8
	28358-65-8	28406-56-6	28924-87-0	28934-98-7	29120-23-8
	29571-17-3	29620-00-6	30265-05-5	30342-23-5	31053-73-3
	31083-73-5	31589-99-8	31700-39-7	4-Pyrenol	31702-08-6
	32287-37-9	32719-43-0	32796-32-0	33486-98-5	33574-11-7
	34160-17-3	34255-08-8	34439-72-0	34749-75-2	Acridine-d9
	34777-33-8	1H-Benzo[c]carbazole	34810-13-4	9-Anthracenecarboxamide	

34879-84-0	34880-57-4	35066-65-0	35139-10-7	35391-47-0
35473-63-3	35737-86-1	35983-73-4	36005-89-7	36749-63-0
36919-44-5	37414-11-2	37414-13-4	37432-21-6	38023-62-0
38321-60-7	38321-61-8	38399-10-9	38474-09-8	38579-27-0
38673-65-3	39139-76-9	39174-47-5	39581-33-4	39612-13-0
39648-58-3	39666-29-0	39758-70-8	39922-13-9	40358-51-8
40603-58-5	40867-32-1	40882-83-5	40904-90-3	40933-02-6
41137-16-0	41137-17-1	41346-16-1	42409-78-9	42917-63-5
43099-11-2	43099-12-3	47077-27-0	47079-56-1	47367-75-9
47604-22-8	47837-61-6	49631-45-0	50438-79-4	50438-83-0
50849-31-5	51038-75-6	51674-11-4	51804-54-7	51822-55-0
51847-39-3	52612-80-3	52647-48-0	52754-39-9	52761-70-3
52776-50-8	52806-22-1	52952-31-5,	29H,31H-Tetrabenzo[b,g,l,q]porphine	
53172-84-2	53402-96-3	53402-97-4	53693-66-6	53693-67-7
53693-68-8	53693-69-9	53871-98-0	53871-99-1	53971-38-3
54226-17-4	55488-88-5	55539-00-9	56013-12-8	56013-13-9
56053-76-0	56085-53-1	56456-42-9	56503-30-1	56525-80-5
56812-43-2	57193-97-2	57703-33-0	57704-78-6	57803-93-7
58195-37-2	58270-06-7	58303-26-7	58384-89-7	59019-35-1
59219-37-3	59405-22-0	59443-09-3	59543-47-4	59543-54-3
59671-36-2	59728-89-1	59728-91-5	59729-16-7	59729-18-9
59957-91-4	60090-85-9	60165-20-0	60171-74-6	60171-75-7
60247-34-9	60884-74-4	60920-21-0	61135-78-2	61247-17-4
61391-15-9	61391-16-0	61391-17-1	61556-11-4	61878-83-9
61905-36-0	61905-37-1	62107-60-2	62399-34-2	62417-20-3
62635-39-6	62888-19-1	63285-04-1	63376-81-8	63376-85-2
63376-99-8	63415-60-1	63697-27-8	63822-42-4	64032-78-6
64140-99-4	64358-50-5	65289-39-6	65289-40-9	65291-18-1
65817-53-0	66277-99-4	66399-06-2	66486-77-9	66610-20-6
66671-26-9	66933-94-6	66933-95-7	66933-96-8	67024-10-6
67168-90-5	67526-83-4,	Benzophenazine		67567-20-8 67588-46-9
67605-76-9	67777-65-5	68243-21-0		

RL: PRP (Properties)

(triplet-triplet absorption spectrum of)

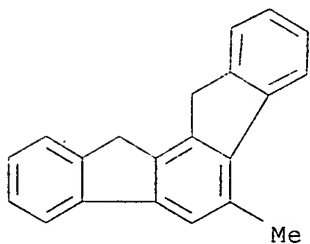
IT **38023-62-0**

RL: PRP (Properties)

(triplet-triplet absorption spectrum of)

RN 38023-62-0 HCAPLUS

CN Indeno[2,1-a]fluorene, 11,12-dihydro-5-methyl- (CA INDEX NAME)



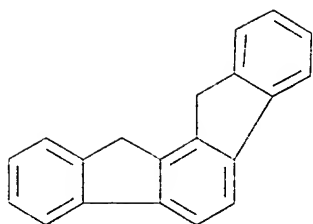
L96 ANSWER 7 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1986:210122 HCAPLUS

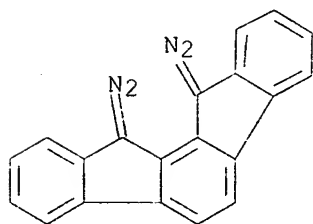
DN 104:210122

TI Characterization of polycyclic aromatic hydrocarbon minerals curtisite, idrialite and pendletonite using high-performance liquid chromatography, gas chromatography, mass spectrometry and nuclear magnetic resonance spectroscopy

AU Wise, Stephen A.; Campbell, Robert M.; West, W. Raymond; Lee, Milton L.;
Bartle, Keith D.
CS Cent. Anal. Chem., Natl. Bur. Stand., Gaithersburg, MD, 20899, USA
SO Chemical Geology (1986), 54(3-4), 339-57
CODEN: CHGEAD; ISSN: 0009-2541
DT Journal
LA English
AB Two polycyclic aromatic hydrocarbon (PAH) minerals, curtisite [12416-83-0]
and idrialite [12416-83-0], were characterized using high-resolution gas
chromatog.-mass spectrometry (GC-MS) and HPLC with fluorescence detection.
Normal-phase HPLC on an aminosilane column was used to sep. the mineral
exts. into 6 fractions based on the number of aromatic C atoms in the PAH.
These fractions were then analyzed by using GC-MS and reversed-phase HPLC
with fluorescence detection to sep. and identify the individual
components. One fraction was also analyzed by using NMR spectroscopy to
provide structural information and information on the position of alkyl
substitution. Using these anal. techniques, the curtisite and idrialite
were found to be unique complex PAH mixts. consisting of 6 sp. PAH
structural series with each member of a series differing from the previous
member by addition of another aromatic ring. The curtisite and idrialite
samples contained many of the same components but in considerably
different relative amts. The major PAH constituents of the curtisite
sample were: picene [213-46-7], dibenzo[a,h]fluorene [239-85-0],
11H-indeno[2,1-a]phenanthrene [220-97-3], benzo[b]phenanthro[2,1-
d]thiophene [55969-62-5], indenofluorenes, chrysene [218-01-9], and
their methyl- and dimethyl-substituted homologs; the major components in
the idrialite sample were higher-mol.-weight PAH, i.e. benzonaphthofluorenes
(mol. weight 316), benzoindenofluorenes (mol. weight 304) and benzopicene
[220-77-9] (mol. weight 328), in addition to the compds. found in the curtisite
sample. The combination of HPLC to isolate sp. PAH groups and the anal.
of these fractions by HPLC-fluorescence and GC-MS resulted in the pos.
identification of .apprx.20 of the >100 PAH found in these 2 samples. The
identification of these compds. supports the conclusions of M. Blumer
(1975) that these minerals were formed by medium-temperature pyrolysis of
organic compds., followed by extended equilibration at elevated temps. in the
subsurface.
CC 53-1 (Mineralogical and Geological Chemistry)
IT 53-70-3 86-74-8 213-46-7 218-01-9 220-77-9 220-97-3 221-11-4
238-84-6 239-01-0 239-35-0 239-85-0 239-88-3 239-94-1 243-17-4
243-28-7 486-52-2 1679-02-3 3351-28-8 3351-31-3 3351-32-4
5815-59-8 7198-82-5 30283-95-5 55969-62-5 60918-47-0
71277-86-6 78790-19-9 102033-98-7 102033-99-8 102034-00-4
102034-01-5 102115-78-6 102124-11-8 102124-12-9 102124-13-0
102124-14-1 102124-15-2 102124-16-3 102124-17-4 102124-18-5
102124-19-6 102124-20-9 102124-21-0 102124-22-1 102124-23-2
102137-62-2
RL: OCCU (Occurrence)
(in curtisite and idrialite, gas chromatog. and HPLC identification of)
IT **5815-59-8**
RL: OCCU (Occurrence)
(in curtisite and idrialite, gas chromatog. and HPLC identification of)
RN 5815-59-8 HCAPLUS
CN Indeno[2,1-a]fluorene, 11,12-dihydro- (CA INDEX NAME)

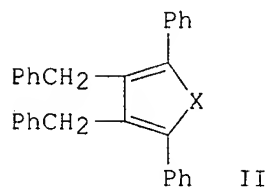


L96 ANSWER 8 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 1984:551229 HCAPLUS
DN 101:151229
TI Photolysis of 1,12-bis(diazo)-1,12-dihydroindeno[2,3-a]fluorene. ESR and optical detection of a σ -type 1,4-biradical
AU Sugawara, Tadashi; Bethell, Donald; Iwamura, Hiizu
CS Dep. Appl. Mol. Sci., Inst. Mol. Sci., Myodaiji, 444, Japan
SO Tetrahedron Letters (1984), 25(22), 2375-8
CODEN: TELEAY; ISSN: 0040-4039
DT Journal
LA English
AB Photolysis of the title bis(diazo) compound in 2-methyltetrahydrofuran glasses at cryogenic temperature has been shown by ESR and UV studies to result in a stepwise cleavage of two nitrogen mols. to give a 1,4- σ -biradical.
CC 22-8 (Physical Organic Chemistry)
IT 92265-85-5
RL: RCT (Reactant); RACT (Reactant or reagent)
(photolysis of)
IT 92265-85-5
RL: RCT (Reactant); RACT (Reactant or reagent)
(photolysis of)
RN 92265-85-5 HCAPLUS
CN Indeno[2,1-a]fluorene, 11,12-bis(diazo)-11,12-dihydro- (9CI) (CA INDEX NAME)



L96 ANSWER 9 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 1979:38738 HCAPLUS
DN 90:38738
OREF 90:6235a,6238a
TI Carbocyclizations and heterocyclizations of ortho-dibenzyl derivatives by the effect of sulfur
AU Lepage, Lucette; Lepage, Yves
CS Lab. Chim. Org. A, UER Sci. Exactes Nat., Limoges, Fr.
SO Journal of Heterocyclic Chemistry (1978), 15(7), 1185-91
CODEN: JHTCAD; ISSN: 0022-152X

DT Journal
 LA French
 OS CASREACT 90:38738
 GI



AB 1,4-Diphenyl-2,3-dibenzyl-1,3-butadiene (I) was prepared by treating di-Et oxalate with PhCH_2MgCl and dehydrating $(\text{PhCH}_2)_2\text{C}(\text{OH})\text{C}(\text{OH})(\text{CH}_2\text{Ph})_2$. Treatment of I with N-bromosuccinimide gave 5,11-diphenylnaphthacene. I reacted with S to give the thiophene II ($\text{X} = \text{S}$). II ($\text{X} = \text{Se}$) was obtained from I and SeO_2 . Benzothiophenes and naphthothiophenes were similarly obtained from other o-dibenzyl compds. and S, with benzo[a]aceanthrylene and indeno[2,1-a]fluorene compds. and by-product.

CC 27-8 (Heterocyclic Compounds (One Hetero Atom))
 Section cross-reference(s): 25, 26

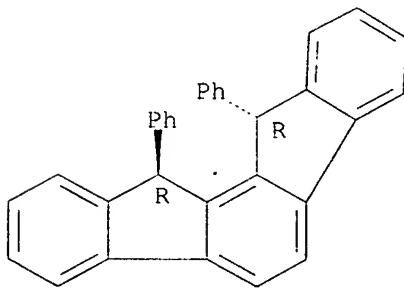
IT 6232-73-1P 13227-37-7P 16587-39-6P 16619-97-9P 18929-58-3P
 33574-65-1P 33574-67-3P 33704-97-1P 38135-10-3P 42894-00-8P
 52210-82-9P 56608-91-4P 68767-79-3P 68767-83-9P 68767-84-0P
 68767-85-1P **68767-86-2P**
 RL: SPN (Synthetic preparation); PREP (Preparation)
 (preparation of)

IT **68767-86-2P**
 RL: SPN (Synthetic preparation); PREP (Preparation)
 (preparation of)

RN 68767-86-2 HCAPLUS

CN Indeno[2,1-a]fluorene, 11,12-dihydro-11,12-diphenyl-, trans- (9CI) (CA INDEX NAME)

Relative stereochemistry.



L96 ANSWER 10 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN
 AN 1972:475056 HCAPLUS
 DN 77:75056
 OREF 77:12399a,12402a
 TI Fluorene acenes and fluorenaphenes. Synthesis of indenofluorenes. XVI.

5-Methyl-, 5,6-dimethyl-, and 5,6-diphenyl-11,12-dihydroindeno[2,1-a]fluorenes

AU Chardonnens, Louis; Bitsch, Serge
 CS Inst. Chim. Inorg. Anal., Univ. Fribourg, Fribourg, Switz.
 SO Helvetica Chimica Acta (1972), 55(5), 1345-52
 CODEN: HCACAV; ISSN: 0018-019X

DT Journal
 LA French

AB 5-Methyl-11,12-dihydroindeno[2,1-a]fluorene was prepared by condensing PhCH:CMcCH:CHPh with maleic anhydride to give 4-methyl-3,6-diphenyl-1,2,3,6-tetrahydrophthalic anhydride, which was aromatized with S, cyclized with AlCl₃-NaCl-KCl and reduced with Zn-H. 5,6-Dimethyl-11,12-dihydroindeno[2,1-a]fluorene was similarly prepared from PhCH:CMcCMc:CHPh. 5,6-Diphenyl-11,12-dihydroindeno[2,1-a]fluorene was prepared by reducing its 11,12-dioxo derivative

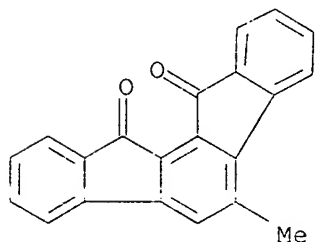
CC 26-4 (Condensed Aromatic Compounds)

IT 1162-64-7P 33776-38-4P 38023-56-2P 38023-57-3P 38023-58-4P
 38023-59-5P 38023-60-8P **38023-61-9P 38023-62-0P**
 38023-63-1P 38023-64-2P 38023-65-3P **38023-66-4P**
38023-67-5P 38023-68-6P 38023-69-7P **38023-71-1P**
38023-72-2P
 RL: SPN (Synthetic preparation); PREP (Preparation)
 (preparation of)

IT **38023-61-9P 38023-62-0P 38023-66-4P**
38023-67-5P 38023-71-1P 38023-72-2P
 RL: SPN (Synthetic preparation); PREP (Preparation)
 (preparation of)

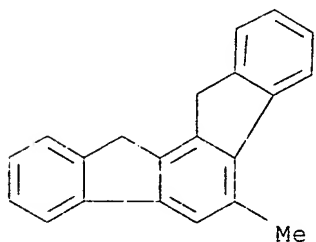
RN 38023-61-9 HCAPLUS

CN Indeno[2,1-a]fluorene-11,12-dione, 5-methyl- (CA INDEX NAME)



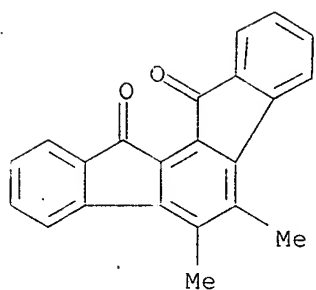
RN 38023-62-0 HCAPLUS

CN Indeno[2,1-a]fluorene, 11,12-dihydro-5-methyl- (CA INDEX NAME)



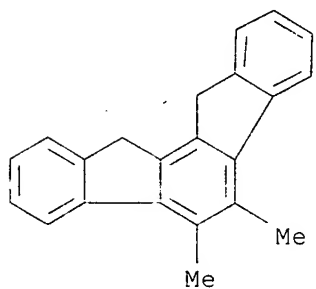
RN 38023-66-4 HCAPLUS

CN Indeno[2,1-a]fluorene-11,12-dione, 5,6-dimethyl- (CA INDEX NAME)



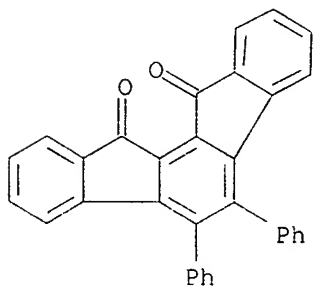
RN 38023-67-5 HCAPLUS

CN Indeno[2,1-a]fluorene, 11,12-dihydro-5,6-dimethyl- (CA INDEX NAME)



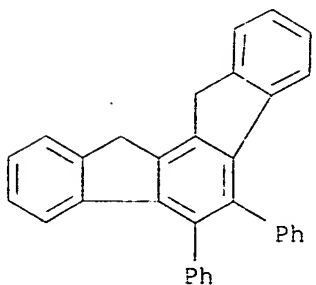
RN 38023-71-1 HCAPLUS

CN Indeno[2,1-a]fluorene-11,12-dione, 5,6-diphenyl- (CA INDEX NAME)

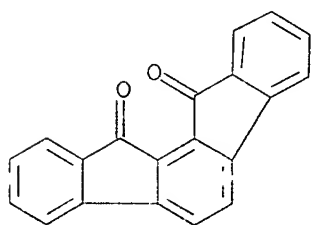


RN 38023-72-2 HCAPLUS

CN Indeno[2,1-a]fluorene, 11,12-dihydro-5,6-diphenyl- (CA INDEX NAME)



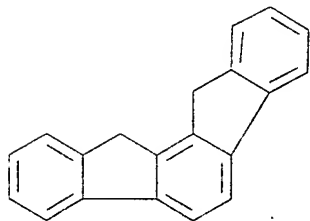
L96 ANSWER 11 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 1965:86263 HCAPLUS
DN 62:86263
OREF 62:15399d-e
TI Column and thin-layer chromatographic separation of polynuclear
ring-carbonyl compounds
AU Sawicki, E.; Stanley, T. W.; Elbert, W. C.; Morgan, M.
CS U.S. Dept. of Health Educ. and Welfare, Cincinnati, OH
SO Talanta (1965), 12(6), 605-16
CODEN: TLNTA2; ISSN: 0039-9140
DT Journal
LA English
AB Methods for the separation of polynuclear ring-carbonyl compds. by Al₂O₃ column
chromatography and Al₂O₃ and cellulose thin-layer chromatography are
described. A method for the thin-layer chromatographic separation of acridones
and phenanthridones from other types of polynuclear compds. is also
described. Compds. on a thin-layer chromatogram are located by
fluorescence methods employing trifluoroacetic acid fumes and Et₄NOH solution
Fluorescence spectra of these compds. on the thin-layer chromatogram and
in solution also are reported.
CC 2 (Analytical Chemistry)
IT **Fluorescence**
(of carbonyl (polynuclear) compds.)
IT 82-05-3, 7H-Benz[de]anthracen-7-one 83-33-0, 1-Indanone 90-44-8,
Anthrone 90-47-1, Xanthen-9-one 91-64-5, Coumarin 134-32-7,
1-Naphthylamine 486-25-9, Fluoren-9-one 492-22-8, Thioxanthen-9-one
548-39-0, Phenalen-1-one 578-95-0, 9-Acridanone 604-59-1,
7,8-Benzoflavone 610-49-1, 1-Anthramine 784-04-3, Ketone, 9-anthryl
methyl 800-16-8, Ketone, phenyl 2-pyrenyl 1015-89-0,
6(5H)-Phenanthridinone 1210-35-1, 5H-Dibenzo[a,d]cyclohepten-5-one,
10,11-dihydro- 2039-77-2, Ketone, methyl 9-phenanthryl 3073-99-2,
5(12H)-Naphthacenone 3074-00-8, 6H-Benzo[cd]pyren-6-one 3074-03-1,
11H-Benzo[b]fluoren-11-one 3074-05-3, Ketone, 6-chrysenyl phenyl
3074-14-4, Indeno[2,1-a]fluorene-11,12-dione 3264-21-9, Ketone,
methyl 1-pyrenyl 3264-24-2; 7H-Dibenzo[c,h]xanthen-7-one
(chromatography and fluorescence of)
IT 3074-14-4, Indeno[2,1-a]fluorene-11,12-dione
(chromatography and fluorescence of)
RN 3074-14-4 HCAPLUS
CN Indeno[2,1-a]fluorene-11,12-dione (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



L96 ANSWER 12 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 1963:4620C2 HCAPLUS
DN 59:62002
OREF 59:11378c-e
TI 2,2'-Biindene

AU Schroth, W.; Schmidt, K.
 CS Karl-Marx Univ., Leipzig, Germany
 SO Zeitschrift fuer Chemie (1963), 3(8), 309
 CODEN: ZECEAL; ISSN: 0044-2402
 DT Journal
 LA Unavailable
 GI For diagram(s), see printed CA Issue.
 AB The title compound (I) was prepared by the following two methods. (A) Addition of Br to indene in EtOH gave 1-ethoxy-2-bromoindan, which was converted with Mg to 1,1'-diethoxy-2,2'-biindan (II). II heated to about 100° in the presence of iodine gave 25-30% I, m. 252°, fluorescing leaflets (ultraviolet light). (B) Pinacol reduction of β -indanone with Al in C₆H₆ gave III, m. 158°. Dehydration of III with Ac₂O and traces of H₂SO₄ gave, without rearrangement, 20-25% I. I can be used to prepare polycyclic systems. E.g., endo-cis-fluorenaphene (IV), m. 285-7°, was prepared via diene addition with maleic anhydride (m.p. of the adduct 264-7°), saponification to the free carboxylic acid, dehydration with S, and decarboxylation. IV was identical with a product prepared in 5-stages from 1,4-diphenylbutadiene (W. Deuschel, CA 45, 10224e).

CC 36 (Condensed Aromatic Compounds)
 IT 787-61-1P, 2,2'-Biindene **5815-59-8P**, Indeno[2,1-a]fluorene, 11,12-dihydro- 93877-16-8P, [2,2'-Biindan]-2,2'-diol 97115-89-4P, 2,2'-Biindan, 1,1'-diethoxy-
 RL: PREP (Preparation)
 (preparation of)
 IT **5815-59-8P**, Indeno[2,1-a]fluorene, 11,12-dihydro-
 RL: PREP (Preparation)
 (preparation of)
 RN 5815-59-8 HCAPLUS
 CN Indeno[2,1-a]fluorene, 11,12-dihydro- (CA INDEX NAME)



L96 ANSWER 13 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN
 AN 1960:62624 HCAPLUS
 DN 54:62624
 OREF 54:12084b-i
 TI The pyrolysis of phenanthrene
 AU Lang, Karl Friedrich; Buffleb, Herbert; Kalowy, Josef
 CS Rutgerswerke Akt.-Ges., Castrop-Rauxel, Germany
 SO Chemische Berichte (1960), 93, 303-9
 CODEN: CHBEAM; ISSN: 0009-2940
 DT Journal
 LA Unavailable
 OS CASREACT 54:62624
 GI For diagram(s), see printed CA Issue.
 AB The pyrolysis of phenanthrene (I) was investigated. I (1.5 kg.) passed at 400 g./hr. over porous clay chips in a stainless steel tube at

720-50° and the condensate (1025 g.) fractionated gave 912 g. unchanged I and 105 g. distillation residue at 5 mm. The residue dissolved in hot xylene and cooled gave 6.1 g. crystals, m. 290-5°, and then 0.6 g. crystals, m. 284-7°. The crystalline product sublimed in vacuo up to 400° and the yellow sublimate (5.25 g.) boiled with maleic anhydride (II), diluted with warm xylene, and filtered gave 4.4 g. colorless 2,2'-biphenanthryl (III), m. 306-7.5° (xylene and sublimed). The sublimation residue sublimed in vacuo at 500° and the sublimate recrystd. from boiling pyrene and C10H7Me gave a colorless hydrocarbon, λ 338 m μ . The xylene mother liquor from the crude III heated with 30 g. II to boiling and cooled deposited 1.8 g. IV. The IV treated with excess boiling II and chloranil, diluted with warm xylene, and cooled gave 1.3 g. 1,12:2,3:10,11-tribenzoperylene-1',2'-dicarboxylic acid anhydride (V), m. 406-11° (sublimed). The mother liquor from IV shaken with dilute aqueous NaOH gave at the interphase 0.38 g. VI. The VI acidified and treated with II and chloranil gave V. V and excess soda-lime heated at 350-400°/1 mm. gave a sublimate of 1,12:2,3:10,11-tribenzoperylene, pale yellow needles, m. 381-1.5° (xylene). The mother liquor from the VI dried and chromatographed on Al2O3 gave material containing 20% 2,3:8,9-dibenzoperylene (VII); a 1.5-g. portion, excess II, and chloranil refluxed 5 hrs., cooled, and diluted with xylene gave 0.65 g. red-violet product which fractionally sublimed at 350-450° gave 1,12:2,3:8,9-tribenzoperylene-1',2'-dicarboxylic acid anhydride, red crystals, m. 409-15°, and 1,2:7,8-dibenzocoronene-3,4:9,10-tetracarboxylic acid anhydride (VIII), brown crystals, m. above 480° (PhNO2). VIII decarboxylated in the usual manner and recrystd. from C10H7Me yielded 1,2:7,8-dibenzocoronene (IX), violet in warm concentrated H2SO4. The mother liquor from the chromatogram treated with excess picric acid and the resulting orange-red picrate, m. 216-17.5°, decomposed with NH4OH gave a hydrocarbon, C28H16 (X), yellow felted needles, m. 260-1° (xylene), probably a phenanthrylenephenanthrene. The mother liquor from X fractionally recrystd. yielded a biphenanthrene (XI), m. 175-5.5°, and another biphenanthrene (XII), needles, m. 210-11.5°. The ultraviolet absorption spectra of III, VII, IX, X, XI, XII, di-K 1,2:7,8-dibenzocoronene-5,6-dicarboxylate, tetra-K 1,2:7,8-dibenzocoronene-4,4,9,10-tetracarboxylate, and 2,3:10,11-dibenzoperylene were recorded.

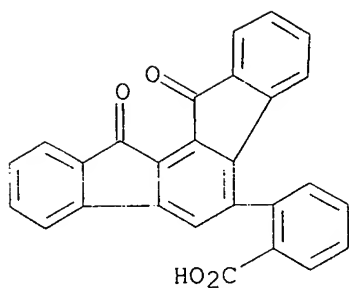
CC 10F (Organic Chemistry: Condensed Carbocyclic Compounds)

IT 190-72-7P, Dibenzo[a,j]coronene 190-81-8P, Tribenzo[b,n,pqr]perylene
 197-74-0P, Dibenzo[fg,qr]pentacene 4482-09-1P, Dibenzo[a,j]coronene-
 1,2,9,10-tetracarboxylic 1,2:9,10-dianhydride 4730-60-3P,
 Tribenzo[b,n,pqr]perylene-15,16-dicarboxylic anhydride 5724-41-4P,
 Benzo[qr]naphtho[2,1,8,7-fghi]pentacene-1,2-dicarboxylic anhydride
 121499-69-2P, Tribenzo[b,n,pqr]perylene-15,16-dicarboxylic anhydride,
 14b,15,16,16a-tetrahydro- 121499-70-5P, Tribenzo[b,n,pqr]perylene-15,16-
 dicarboxylic acid, 15,16-dihydro-, disodium salt 124121-54-6P,
 Benzoic acid, o-(11,12-dihydro-11,12-dioxoindeno[2,1-a]fluoren-5-yl)-
 RL: PREP (Preparation)
 (preparation of)

IT 124121-54-6P, Benzoic acid, o-(11,12-dihydro-11,12-dioxoindeno[2,1-
 a]fluoren-5-yl)-
 RL: PREP (Preparation)
 (preparation of)

RN 124121-54-6 HCAPLUS

CN Benzoic acid, o-(11,12-dihydro-11,12-dioxoindeno[2,1-a]fluoren-5-yl)-
 (6CI) (CA INDEX NAME)



L96 ANSWER 14 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1958:11061 HCAPLUS

DN 52:11061

OREF 52:1981c-i,1982a-i,1983a-i,1984a-i,1985a

TI Autoxidation of orthoquinoid indenofluorene hydrocarbons

AU Le Berre, Andre

CS Univ. Paris

SO Ann. chim. (Paris) (1957), 2, 371-425

DT Journal

LA Unavailable

AB Biradicaloid o-quinoid hydrocarbons, 11,12-diphenylideno[2,1-a]fluorene (I) and 13,14-diphenylbenz[c]indeno[2,1-a]fluorene (II), capable of acting as free radicals and undergoing autoxidation, were prepared. Freshly distilled SOCl₂ (50 cc.) and 10 g. 2-phenyl-9-oxo-1-fluorene-carboxylic acid, m. 198-9°, refluxed 45 min., the excess SOCl₂ evaporated in vacuo, the crude chloride heated in 15 min. from 150° to 250°, the crude fluorenedione taken up in 1.2 l. boiling xylene, filtered hot, and the filtrate cooled and filtered gave 8-8.5 g. indeno[2,1-a]fluorene-11,12-dione (III), m. 300-1 (PhNO₂), λ 257.5, 294, 375, 392, 440-50 mμ (log ε 4.54, 4.57, 3.71, 3.70, 2.68, all measurements in CHCl₃); 2-phenyl-9-oxo-1-fluorene-carbonyl chloride (IIIa), m. 192-4° (anhydrous C₆H₆). Pure III (1 g.) in 25 cc. MeOH treated 30 min. with 0.5 g. KBH₄, the excess reagent destroyed with 2 cc. AcOH, filtered, and the precipitate washed with a few cc. MeOH gave 0.65 g. 11,12-dihydro-11,12-dihydroxyindeno[2,1-a]fluorene (IV), m. 274-5°, λ 316, 330 mμ (log ε 4.54, 4.47). The MeOH mother liquor poured into H₂O and filtered gave 0.16 g. of the low-melting isomer (IVa), m. 218-19° (MeOH, after heating at 100°/0.5 mm.), converted into IV by heating several min. at 220°/0.5 mm. IV (or IVa) (25 mg.) in 2 cc. 5% KOH in MeOH boiled several min. and the dark red mixture stirred in air gave 22 mg. III. IV (or IVa) (0.1 g.) boiled 10 min. in 10 cc. 10% HBr in AcOH, the cooled mixture filtered, and the precipitate washed

with AcOH and H₂O gave 0.13 g. 11,12-dibromo-11,12-dihydroindeno[2,1-a]fluorene (IVb), m. 214-15° (EtOAc), λ 253, 306, 323 (log ε 4.46, 4.29, 4.29). IVb (0.1 g.) treated 24 hrs. with 0.2 g. powdered Zn in 10 cc. AcOH at 20°, the mixture filtered, the residue washed repeatedly with hot C₆H₆, the filtrate and washings washed with H₂O, dried over Na₂SO₄, evaporated, and the residue washed with Et₂O gave 16 g. 11,12-dihydroindeno[2,1-a]fluorene, m. 288-8.5° (xylene), λ 309, 324 mμ (log ε 4.65, 4.68). IV (0.1 g.) heated 10 min. at 275° in a sealed evacuated tube and the dried product crystallized from EtOAc gave 75-80 mg. indeno[2,1-a]fluorene-11(12H)-one (V), m. 215°, λ 288, 440 mμ (log ε 4.84, 3.32), together with a few crystals of 11,12-dihydro-11-hydroxyindeno[2,1-a]fluorene (VI). V (50 mg.) in 2 cc. MeOH treated 30 min. at 20° with 25 mg. KBH₄,

and the mixture diluted with H₂O and filtered gave 60 mg. VI, m. 223-5° (solidifying and m. 232-3°), λ 255, 311.5 m μ (log ϵ 4.06, 4.54). V (50 mg.) and 34 mg. N-bromosuccinimide refluxed 3 hrs. in 5 cc. CCl₄ and the product crystallized from C₆H₆ yielded 52 mg. 12-Br derivative of V, m. 243-4°, λ 260, 294, 440 m μ (log ϵ 4.48, 4.56, 3.13). III (5 g.) in 500 cc. dry C₆H₆ treated with 7.5 g. PhMgBr in 100 cc. Et₂O (N atmospheric), stored 3 hrs. at 20°, and poured onto ice containing a small volume of HCl, the C₆H₆ solution washed with 10% HCl and H₂O, the dried solution evaporated, and the residue chromatographed over Al₂O₃ in a min. of Cl₂C:CHCl and eluted with C₆H₁₄ and C₆H₆ gave 5.45 g. 11,12-dihydro-11,12-dihydroxy-11,12-diphenylindeno[2,1-a]fluorene (VII), m. 224° (alc.), λ 320, 338 m μ (log ϵ 4.56, 4.50), 0.04 g. isomeric compound (VIIa), m. 276° (C₆H₆, after heating at 100°/0.5 mm.), λ 323, 340.5 m μ (log ϵ 4.50, 4.46), and 0.11 g. 12-hydroxy-phenylindeno[2,1-a]fluorene-11(12H)-one, m. 227-8° (C₆H₆, after heating at 100° 0.5 mm.), λ 253, 298, 450 m μ (log ϵ 4.50, 4.62, 3.25), converted with PhMgBr to VII. VII (25 mg.) treated 1 hr. at 20° with 0.25 cc. Ac₂O containing a trace of ZnCl₂ and the product washed with AcOH gave 15 mg. 11,12-diacetate of VII, m. 309-10°, λ 320.5, 338.5 m μ (log ϵ 4.58, 4.52). VII (1 g.) boiled 10 min. with 25 cc. 10% HBr in AcOH with stirring, the cooled mixture filtered, and the crystalline precipitate washed with AcOH and H₂O gave 1.18 g. crude product, m. 260-2°, which, taken up in a min. of CHCl₄ and precipitated with 2 vols. Et₂O yielded 1 g. 11,12-dibromo-11,12-dihydro-11,12-diphenylindeno[2,1-a]fluorene (VIII), m. 263-6° (decomposition), λ 264, 330 m μ (log ϵ 4.49, 4.25). VIII (0.1 g.) in 5 cc. warm dioxane diluted with 5 cc. H₂O, stored, diluted with 5 cc. H₂O, and the crude product separated by fractional crystallization from alc. yielded 52 mg. VII and 19 mg. VIIa. VII (0.25 g.), 0.25 g. KI, and 0.3 g. NaH₂PO₂·H₂O refluxed 3 hrs. in 25 cc. AcOH, the solution poured into aqueous Na₂S₂O₃, filtered, the precipitate taken up in C₆H₆, the solution washed with H₂O, the extract evaporated, and the residue fractionally crystallized from AcOH gave 25 mg. 11,12-dihydro-11,12-diphenylindeno[2,1-a]fluorene (IX), m. 328-30° (C₆H₆), λ 315.5, 331 m μ (log ϵ 4.60, 4.64), and 0.16 g. isomeric compound (IXa), m. 266° (C₆H₆), λ 312, 327 m μ (log ϵ 4.64, 4.68). VIII (0.25 g.) boiled 10 min. with 0.5 g. powdered Zn in 25 cc. AcOH and the crude product washed with C₆H₁₄ and fractionated in AcOH gave 27 mg. IX and 0.1 g. di-AcO derivative, m. 309-10°. VIII (1 g.) in 50 cc. C₆H₆ refluxed 30 min. with stirring in the presence of 0.5 g. active Cu [cf. Piccard, Helv. Chim. Acta 5, 147(1922)] (all operations in a CO₂ atmospheric), the cold solution filtered, the residual Cu washed several times with C₆H₆, the exts. and filtrate evaporated in vacuo, the crude product taken up in 50 cc. boiling EtOAc, the solution concentrated to about 20 cc., cooled slowly, the mother liquors decanted, and the crystals washed with EtOAc and Et₂O and dried immediately in vacuo gave 0.4-0.5 g. violet-black crystalline I, m. 249-51°, λ 287, 556 m μ (log ϵ 4.62, 4.03), converted by Br in CCl₄ to VIII. I (0.25 g.) boiled 15 min. with 0.5 g. powdered Zn in 30 cc. AcOH (N atmospheric), and the product washed with Et₂O and fractionated in C₆H₆ and AcOH gave 0.13 g. IX and 0.07 g. IXa. I (0.25 g.) boiled 1.5 hrs. (N atmospheric) with 0.25 g. KBH₄ in 25 cc. alc. and 25 cc. tetrahydrofuran, the solution poured into H₂O,

the precipitate taken up in C6H6, the extract evaporated, and the residue washed with

Et2O gave 0.2 g. IXa. I (50 mg.) and 15 mg. maleic anhydride in 1 cc. xylene boiled 50 hrs. in an evacuated sealed tube, the solution cooled and filtered, the precipitate washed with Et2O, and the product (44 mg.) recrystd. from C6H6 gave the adduct, C36H22O3, m. 315°, λ 321, 337.5

m μ (log ϵ 4.47, 4.46). A series of benz[c]indeno[2,1-a]fluorene derivs. were prepared. The maleic anhydride adduct of diphenylisobenzofuran (5 g.) treated 40-50 hrs. with 100 cc. pure H2SO4 according to the procedure of Weiss and Abel's (C.A. 27, 722), the green liquid poured onto cracked ice, filtered, and the precipitate washed with hot H2O, dried, washed with hot C6H6, and crystallized from xylene or PhNO2 gave 2.5-3.0 g. benz[c]indeno[2,1-a]fluorene-13,14-dione (X), m.

309-10°, λ 265, 290, 440-50 m μ (log ϵ 4.79, 4.57, 3.76). X (1 g.) in 200 cc. MeOH and 200 cc. CHCl4 stirred gently 30 min. to 2 hrs. with 0.5 g. KBH4 to complete solution, treated with 10 cc. AcOH, stored overnight, filtered, and the crystalline precipitate washed with MeOH

gave 0.87

g. 13,14-dihydro-13,14-dihydroxybenz[c]indeno[2,1-a]fluorene (XI), m. 309-12°, λ 253, 369, 388 m μ (log ϵ 4.58, 4.43, 4.39). XI (50 mg.) and 3 g. ClOH8 boiled 3 hrs. and the excess C 10H8 extracted with Et2O gave 26 mg. X, similarly obtained by 3 hrs. boiling in PhNO2, by fusion in air, and by autoxidation in alkaline media. XI (0.1 g.) heated 10 min. in 10 cc. 10% HBr in AcOH gave 0.11 g. 13,14 - dibromo - 13,14 - dihydrobenz[c]indeno[2,1 - a]fluorene (XII), m. 315-18° (dioxane), λ 264, 319, 375, 390 m μ (log ϵ 4.77, 3.98, 4.21, 4.17). XII with active Cu gave only amorphous resins. XII (0.1 g.) boiled 15 min. in 10 cc. AcOH with 0.2 g. powdered Zn and the product

crystallized

from EtOAc and xylene yielded 30% 13,14-dihydrobenz[c]indeno[2,1-a]fluorene (XIII), m. 218-19°, λ 249, 355, 373 m μ (log ϵ 4.50, 4.54, 4.53). XI (0.25 g.) and 8 g. tech. ClOH8 heated 5 hrs. at 250-60° in a sealed evacuated tube, the cooled melt extracted with Et2O, and the residue crystallized from xylene gave 0.15-0.16 g. benz[c]indeno[2,1-a]fluorene-13(14H)-one (XIV), m. 255°, λ 242, 277, 310, 355, 483 m μ (log ϵ 4.55, 4.52, 4.52, 3.92, 3.54), oxidized by refluxing 12 hrs. with 2 parts by weight SeO2 in 20 parts by volume AcOH to 65% X. XIV (0.1 g.) in 20 cc. EtOH and 20 cc. CHCl3 boiled 15-20 min. with 0.05 g. KBH4, the colorless solution treated with 2 cc. AcOH and the cooled solution filtered, and the crystals washed with alc. and dried gave 90% 12,14-dihydro-13-hydroxybenz[c]indeno[2,1-a]fluorene, m. 263-5° (dioxane), λ 253, 364, 382 m μ (log ϵ 4.45, 4.33, 4.32), converted by 10% HBr in AcOH to a yellow crystalline mixture of 13-bromobenz[c]indeno[2,1-a]fluorene with some XII, m. 243-6° (xylene); reduced by boiling 3 hrs. with powdered Zn in AcOH to XIII. XIV (0.1 g.) and 0.06 g. N-bromosuccinimide boiled 1 hr. in 10 cc. CCl4 and the product washed with Et2O gave 0.1 g. 14-Br derivative of XIV, m. 252-3°, λ 258, 320, 377, 480 m μ (log ϵ 4.66, 4.28, 3.84, 3.47). Phenylation of 5 g. X in 500 cc. C6H6 with 5.5 g. PhMgBr in 100 cc. Et2O and chromatography of the product in Cl2C:CHCl on Al2O3 yielded 4.45 g. 13,14-dihydro-13,14-dihydroxy-13,14-diphenylbenz[c]indeno[2,1-a]fluorene (XV), m. 299-300° (showing dimorphism and thermochromy), λ 244, 255, 357, 374, 394 m μ (log ϵ 4.62, 4.60, 4.20, 4.43, 4.43), 0.060 g. isomeric compound (XVa), m. 348-9° (thermochromic), λ 243, 252.5, 358.5, 376, 396.5 m μ (log ϵ 4.64, 4.62, 4.20, 4.43, 4.42), and 0.28 g. 14-hydroxy-14-phenylbenz[c]indeno[2,1-a]fluorene-13(14H)-one, m. 289-90°, λ 252.5, 320, 361, 500 m μ (log ϵ 4.63, 4.42, 3.99, 3.47), further phenylated with PhMgBr to XV. XV (or XVa) (1 g.) refluxed 10 min. in 25 cc. 10% HBr in AcOH, filtered, and the yellow

cryst, precipitate washed with a small amount of AcOH and with H₂O gave 1.00 g. 13,14-dibromo-13,14-dihydro-13,14-diphenylbenz[c]indeno[2,1-a]fluorene (XVI), m. 254-6° (decomposition), λ 265, 385, 400 m μ (log ϵ 4.72, 4.17, 4.14). XV (0.25 g.), 0.4 g. KI, and 0.8 g. NaH₂PO₂·H₂O in 25 cc. AcOH refluxed 8 hrs. and poured into aqueous Na₂S₂O₃, the mixture filtered, the precipitate taken up in C₆H₆, the extract evaporated, and the stereoisomeric mixture separated by chromatography from C₆H₁₄ on Al₂O₃ yielded 0.16 g. 13,14-dihydro-13,14-diphenylbenz[c]indeno[2,1-a]fluorene, m. 281-2° (EtOAc), λ 252, 342-348, 358.5, 377.5 m μ (log ϵ 4.57, 4.28, 4.50, 4.49), and 25 mg. of an isomer, m. 292-3° (C₆H₆), λ 248, 345-352, 364, 382.5 m μ (log ϵ 4.57, 4.25-4.26, 4.46, 4.44). The same isomers were obtained by treating 0.5 g. XVI 30 min. with 2 g. powdered Zn in 50 cc. AcOH at 20°. Attempts to obtain II from XVI with metals in organic solvents in vacuo or under inert gases gave solns., at first intensely green and later yellowish brown with a blue-violet fluorescence, yielding only resinous products on evaporation XVI (0.5 g.) and 0.085 g. maleic anhydride in 25 cc. dry C₆H₆ treated 1 hr. with 300 mg. active Cu at 20° (N atmospheric), filtered, the Cu residue washed with hot C₆H₆, the filtrate and washings evaporated, and the residue washed with Et₂O and crystallized from xylene gave 49 mg. adduct, C₄₀H₂₀O₃, m. 366-8°, λ 261, 386 m μ (log ϵ 4.36, 4.40). In neutral solvents (Et₂O, C₆H₆, CHCl₃, CS₂) with or without addition of antioxidants [4,2,6-Me(tert-Bu)₂C₆H₂OH (XVIa), hydroquinone (XVIb), pyrogallol (XVIc)] or in the presence of AcOH, I rapidly adsorbed O with change of color from blue-violet to pale yellow with or without irradiation. Autoxidation in C₆H₆, CS₂, or CHCl₃ without additives but under all conditions of temperature, concentration, irradiation, or lack of irradiation, and evaporation of the solvent in vacuo at 20° gave a pale beige amorphous powder, C₃₂H₂₀O₂, reduced by LiAlH₄ in tetrahydrofuran to a small amount of an isomer of 9-hydroxy-2-(o-hydroxyphenyl)-9-phenyl-1-(α -hydroxybenzyl)fluorene (XVII), m. 240°. Autoxidation in Et₂O and in CS₂ gave the same powder, together with traces of VIIa and 1-benzoyl-9-hydroxy-2-(o-hydroxyphenyl)-9-phenylfluorene (XVIII), m. 266-8°, resp. Autoxidation of 50 mg. I in C₆H₆ in the presence of 2 mg. XVIa, XVIb, or XVIc gave resins containing 0, 13, or 74% VIIa. I (50 mg.) in 10 cc. C₆H₆ containing 0.1, 1.0, and 2.0 cc. AcOH, resp., gave on autoxidation, 0, 49, and 57% XVIII. I (0.2 g.) in 40 cc. dioxane and 20 cc. AcOH decolorized by a slow current of O, the pale yellow solution poured into H₂O, the mixture filtered, the precipitate washed with H₂O, recrystd. from xylene, and the crystals desolvated by washing with Et₂O or by heating yielded 62-6% XVIII, m. 271°, λ 243, 287, 328, 342 m μ (log ϵ 4.39, 4.29, 4.06, 4.03), also obtained by treatment of VIII with active Cu in C₆H₆, chromatographic purification of the product from dioxane on Al₂O₃, and elution with C₆H₁₄ and EtOH. XVIII (0.1 g.) in 2 cc. anhydrous tetrahydrofuran treated rapidly with 0.05 g. LiAlH₄ added portionwise, the mixture refluxed 4-5 min., the solution separated from the excess LiAlH₄ poured into 100 cc. Et₂O, the excess LiAlH₄ washed with a small volume of tetrahydrofuran, the washings and Et₂O solution filtered, the filtrate washed with 10% HCl and H₂O, evaporated, and the residue recrystd. from EtOH and dried at 140/0.5 mm. gave 9-hydroxy-1-(o-hydroxyphenyl)-9-phenyl-9-(α -hydroxybenzyl)fluorene, m. 205-6°, λ 245, 288 m μ (log ϵ 4.30, 4.27). XVIII (0.1 g.) in 2 cc. freshly distilled SOCl₂ containing 0.1 g. rigorously dry Na₂CO₃ kept 30 min. at 20°, the SOCl₂ evaporated in vacuo, the residue extracted with boiling Et₂O, the extract concentrated, filtered, the product taken up in 15-18 cc. boiling C₆H₆, and the extract

concentrated gave 84 mg. 1-benzoyl-9-chloro-2-(*o*-hydroxyphenyl)-9-phenylfluorene, m. 282-4°, λ 250, 293 μ m (log ϵ 4.42, 4.19), converted by boiling 20 mg. 30 min. in 5 cc. dioxane diluted with 5 cc. H₂O, extracting the cooled solution with Et₂O, and crystallizing the product from xylene to 16 mg. XVIII. XVIII (0.1 g.) treated 45 min. at 20° with 10 cc. 20% HI in AcOH, the mixture poured into aqueous Na₂S₂O₃, the precipitate taken up in Et₂O, the extract evaporated, the mixed product taken up in hot C₆H₆, the cooled solution filtered, and the crystalline precipitate washed with EtOAc gave 58 mg. 1,13-diphenyl-13H-1,2-benzopyrano[3,4-*a*]fluorene (XIX), m. 294-5° (from C₆H₆), λ 242, 294.5, 326.5 μ m (log ϵ 4.33, 4.27, 4.48). The filtrate and washings evaporated, the residue taken up in hot EtOAc, the cooled mixture filtered from 10 mg. mineral product, m. 116-17° (resolidifying and m. 120-1°), and the filtrate cooled and filtered gave 22 mg. isomeric compound (XIXa), m. 226-8°, λ 242.5, 292, 324 μ m (log ϵ 4.19, 4.25, 4.44). The isomers, XIX and XIXa, were insol. in pure H₂SO₄ and in KOH in MeOH. IIIa (0.5 g.) in 250 cc. anhydrous Et₂O treated 1 hr. with 0.6 g. PhMgBr in Et₂O at 20° (N atmospheric), poured onto ice and HCl, the Et₂O layer washed with aqueous Na₂CO₃ and H₂O, the dried extract evaporated, and the product washed with Et₂O gave 0.22 g. 1-benzoyl-9-hydroxy-2,9-diphenylfluorene, m. 239° (EtOAc), λ 244, 291, 334 μ m (log ϵ 4.43, 4.40, 3.70), converted by LiAlH₄ reduction in tetrahydrofuran, crystallization of the product from EtOH and desolvation at 120°/0.5 mm. to 75% 9-hydroxy-2,9-diphenyl-1-(α -hydroxybenzyl)fluorene, m. 180-1°, λ 244, 288 μ m (log ϵ 4.35, 4.29). II was extremely sensitive to air. XVI (0.5 g.) in 50 cc. C₆H₆ and 5 cc. AcOH treated 1 hr. at 20° in the presence of air with 0.5 g. active Cu, the mixture filtered, the washed filtrate evaporated, and the resinous product washed with Et₂O and crystallized repeatedly from xylene yielded 29% 7-hydroxy-5-(*o*-hydroxyphenyl)-6-benzoyl-7H-benzo[*c*]fluorene (XX), m. 318-19° (xylene), λ 245, 338, 365 μ m (log ϵ 4.67, 4.12, 3.92), soluble in 5% KOH in MeOH, and a small amount of the diol XVa. VIII (1 g.) in 100 cc. dioxane at 0° containing 1 g. Na₂CO₃ treated rapidly dropwise with 20 cc. 80% H₂O₂, the mixture stirred 30 min. at 50°, the colorless solution poured into H₂O, filtered, the precipitate taken up in Et₂O, the washed and dried extract evaporated in vacuo, and the residue crystallized from Et₂O gave 0.54 g. 11,12-dihydro-11,12-diphenylindeno[2,1-*a*]fluorene 11,12-bis(hydroperoxide) (XXI), m. 260-2° (C₆H₆ and dried at 80°/0.5 mm.), λ 240.5, 322.5, 340 μ m (log ϵ 4.52, 4.53, 4.45). The Et₂O mother liquors concentrated to 1 cc., diluted with 1 cc. C₆H₁₂, filtered, and the crystals washed with C₆H₁₂ and Et₂O, recrystd. from C₆H₆, and dried at 80°/0.5 mm. gave 47 mg. isomer (XXIa), m. 232-4°, λ 242, 320, 337.5 μ m (log ϵ 4.52, 4.57, 4.47). XXI (0.1 g.) heated 10 min. at 200°/0.1 mm. evolved 2.30 cc. gas (19°, 760 mm.) containing 13% CO₂ and 83% O; the residue crystallized from CHCl₃-C₆H₁₂ yielded 35% VIIa but no III. XXI (0.125 g.) in 5 cc. warm dioxane cooled and treated 30 min. with 5 cc. 0.1M Pb(OAc)₄ in AcOH, the mixture poured into Et₂O, the solution washed with 5% NaOH, 10% HCl, and H₂O, the solvent evaporated, and the resinous product crystallized from Et₂O-C₆H₁₂ and xylene gave 45 mg. XVIII. XXI (0.1 g.) in 50 cc. AcOH containing 0.1 cc. pure H₂SO₄ kept 24 hrs. at 20°, poured into H₂O, the precipitate taken up in Et₂O, the washed and dried solution evaporated, and the residue crystallized from C₆H₆

and xylene gave 32 mg. XVIII. XVI (0.5 g.) in 50 cc. dioxane containing 0.25 g. Na₂CO₃ at 0° treated with 80% H₂O, the mixture stirred gently 24 hrs. at 20°, poured into excess H₂O, filtered, the precipitate taken up in Et₂O, the washed and dried extract evaporated, and the residue crystallized from

boiling Et₂O gave 0.41 g. 13,14-dihydro-13,14-diphenylbenz[c]indeno[2,1-a]fluorene bis(hydroperoxide) (XXII), m. 180° (foaming), λ 244, 360, 378, 398.5 mμ (log ε 4.64, 4.18, 4.39, 4.38), transformed on boiling in AcOH into XVa. XXII (0.1 g.) heated at 145-50°/0.1 mm. evolved 2.20 cc. gas (25°/760 mm.) containing 36% CO₂ and 61% O; recrystn. of the residue from CHCl₃-C₆H₆ gave 17 mg. XVa. No PhOH or XI were formed.

XXII (0.28 g.) in 15 cc. dioxane treated 15 min. at 20° with 15 cc. 0.1M Pb(OAc)₄ in AcOH, the mixture poured into Et₂O, the solution washed with 5% NaOH, 10% HCl, and H₂O, the dried extract evaporated, and the residue crystallized

from CHCl₃-C₅H₁₂ and xylene yielded 20% XX. XXII in AcOH containing a trace of H₂SO₄ rapidly deepened in color from violet-rose to clear violet-red but no crystalline product could be isolated. Although the expected cyclic peroxides were not isolated, their intermediate occurrence as precursors in the formation of the HO ketone end products was confirmed by the results of autoxidation in acid media. Detailed schemes of the stepwise transformations were charted and interpretations of the various possible mechanisms, as supported by ultraviolet absorption measurements, were discussed.

CC 10 (Organic Chemistry)

IT **Fluorescence**

Ultraviolet and visible, spectra
(of indenofluorene derivs.)

IT **3074-14-4P**, Indeno[2,1-a]fluorene-11,12-dione **5815-59-8P**
 , Indeno[2,1-a]fluorene, 11,12-dihydro- 34706-87-1P,
 Benz[c]indeno[2,1-a]fluorene-13,14-dione 102170-95-6P,
 Fluorene-1-carbonyl chloride, 9-oxo-2-phenyl- 103266-74-6P, Ketone,
 9-chloro-2-(o-hydroxyphenyl)-9-phenylfluorene-1-yl phenyl 103266-98-4P,
 Ketone, 9-hydroxy-2,9-diphenylfluorene-1-yl phenyl 103398-18-1P,
 Fluorene-1-methanol, 9-hydroxy-α,2,9-triphenyl- 111032-51-0P
 , Indeno[2,1-a]fluorene, 11,12-dibromo-11,12-dihydro- 111386-76-6P
 , Indeno[2,1-a]fluorene-11(12H)-one, 12-bromo- 112553-53-4P,
 Indeno[2,1-a]fluorene-11(12H)-one 114353-12-7P, Benz[c]indeno[2,1-a]fluorene-13-ol, 13,14-dihydro- 114793-43-0P, Benz[c]indeno[2,1-a]fluorene-13,14-diol, 13,14-dihydro- 114889-39-3P,
 Indeno[2,1-a]fluorene-11-ol, 11,12-dihydro- 119925-92-7P,
 Benz[c]indeno[2,1-a]fluorene-13(14H)-one, 14-hydroxy-14-phenyl- 120233-37-6P, Benz[c]indeno[2,1-a]fluorene-13(14H)-one, 14-bromo- 120233-41-2P, Benz[c]indeno[2,1-a]fluorene, 13,14-dibromo-13,14-dihydro- 120233-49-0P, Benz[c]indeno[2,1-a]fluorene-13(14H)-one 120233-54-7P,
 Benz[c]indeno[2,1-a]fluorene, 13-bromo-13,14-dihydro- 120233-63-8P,
 Benz[c]indeno[2,1-a]fluorene, 13,14-dihydro- 120267-45-0P,
 Indeno[2,1-a]fluorene, 11,12-dibromo-11,12-dihydro-11,12-diphenyl- 121967-72-4P, Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-11,12-diphenyl-, diacetate 122273-24-9P,
 Benz[a]indeno[1,2,3-fg]aceanthrylene-9,10-dicarboxylic anhydride, 8b,9,10,10a-tetrahydro-8b,10a-diphenyl- 124269-74-5P, Hydroperoxide, (13,14-dihydro-13,14-diphenylbenz[c]indeno[2,1-a]fluorene-13,14-ylene)di- 124290-45-5P, Indeno[1,2,3-cd]fluoranthene-5,6-dicarboxylic anhydride, 4b,5,6,6a-tetrahydro-4b,6a-diphenyl- 124513-91-3P, Benz[c]indeno[2,1-a]fluorene, 13,14-dibromo-13,14-dihydro-13,14-diphenyl- 124514-15-4P, Ketone, 7-hydroxy-5-(o-hydroxyphenyl)-7-phenyl-7H-benzo[c]fluorene-6-yl phenyl **876504-70-0P**, Indeno[2,1-a]fluorene-11(12H)-one, 12-hydroxy-12-phenyl-

RL: PREP (Preparation)
(preparation of)

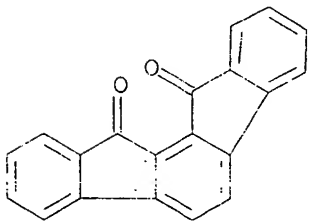
IT 103267-02-3, Ketone, 9-hydroxy-2-(o-hydroxyphenyl)-9-phenylfluoren-1-yl
phenyl 116032-16-7, Fluorene-1-methanol, 9-hydroxy-2-(o-hydroxyphenyl)-
 α ,9-diphenyl- 124139-88-4, Benzo[b]fluoreno[2,1-d]pyran,
11,12-dihydro-11,12-diphenyl- 124145-09-1, Hydroperoxide,
(11,12-dihydro-11,12-diphenylindeno[2,1-a]fluoren-11,12-ylene)di-
124180-22-9, Indeno[2,1-a]fluorene-11,12-diol,
11,12-dihydro-11,12-diphenyl- 124180-97-8, Indeno[2,1-
a]fluorene, 11,12-dihydro-11,12-diphenyl- 856642-59-6,
Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-
(stereoisomers)

IT 3074-14-4P, Indeno[2,1-a]fluorene-11,12-dione 5815-59-8P
, Indeno[2,1-a]fluorene, 11,12-dihydro- 111032-51-0P,
Indeno[2,1-a]fluorene, 11,12-dibromo-11,12-dihydro- 111386-76-6P
, Indeno[2,1-a]fluoren-11(12H)-one, 12-bromo- 112553-53-4P,
Indeno[2,1-a]fluoren-11(12H)-one 114889-39-3P,
Indeno[2,1-a]fluoren-11-ol, 11,12-dihydro- 120267-45-0P,
Indeno[2,1-a]fluorene, 11,12-dibromo-11,12-dihydro-11,12-diphenyl-
121967-72-4P, Indeno[2,1-a]fluorene-11,12-diol,
11,12-dihydro-11,12-diphenyl-, diacetate 876504-70-0P,
Indeno[2,1-a]fluoren-11(12H)-one, 12-hydroxy-12-phenyl-

RL: PREP (Preparation)
(preparation of)

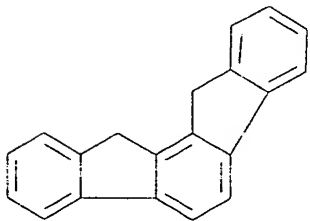
RN 3074-14-4 HCAPLUS

CN Indeno[2,1-a]fluorene-11,12-dione (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



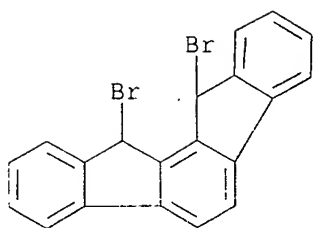
RN 5815-59-8 HCAPLUS

CN Indeno[2,1-a]fluorene, 11,12-dihydro- (CA INDEX NAME)

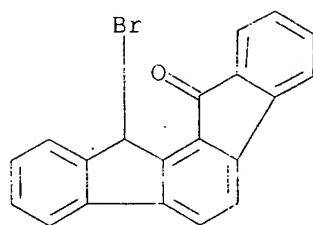


RN 111032-51-0 HCAPLUS

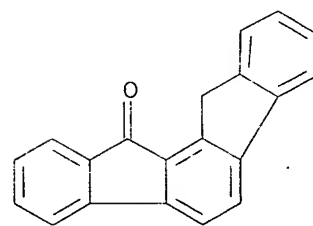
CN Indeno[2,1-a]fluorene, 11,12-dibromo-11,12-dihydro- (CA INDEX NAME)



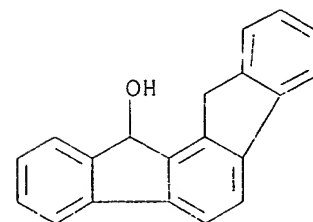
RN 111386-76-6 HCAPLUS
 CN Indeno[2,1-a]fluoren-11(12H)-one, 12-bromo- (CA INDEX NAME)



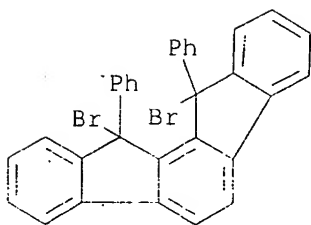
RN 112553-53-4 HCAPLUS
 CN Indeno[2,1-a]fluoren-11(12H)-one (CA INDEX NAME)



RN 114889-39-3 HCAPLUS
 CN Indeno[2,1-a]fluoren-11-ol, 11,12-dihydro- (CA INDEX NAME)

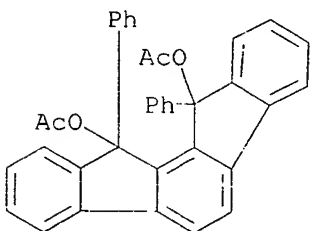


RN 120267-45-0 HCAPLUS
 CN Indeno[2,1-a]fluorene, 11,12-dibromo-11,12-dihydro-11,12-diphenyl- (CA INDEX NAME)



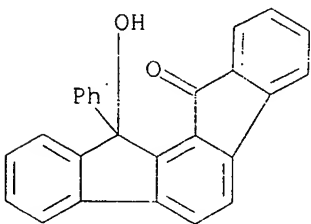
RN 121967-72-4 HCAPLUS

CN Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-11,12-diphenyl-, diacetate (6CI) (CA INDEX NAME)



RN 876504-70-0 HCAPLUS

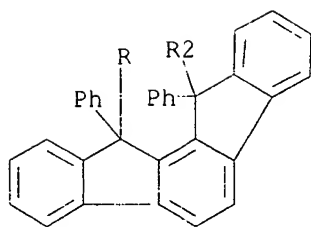
CN Indeno[2,1-a]fluoren-11(12H)-one, 12-hydroxy-12-phenyl- (CA INDEX NAME)



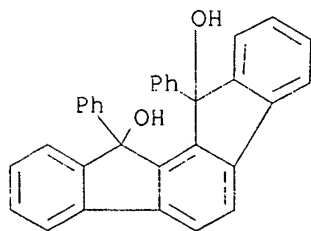
IT 124145-09-1, Hydroperoxide, (11,12-dihydro-11,12-diphenylindeno[2,1-a]fluoren-11,12-ylene)di- 124180-22-9, Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-11,12-diphenyl- 124180-97-8, Indeno[2,1-a]fluorene, 11,12-dihydro-11,12-diphenyl- 856642-59-6, Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro- (stereoisomers)

RN 124145-09-1 HCAPLUS

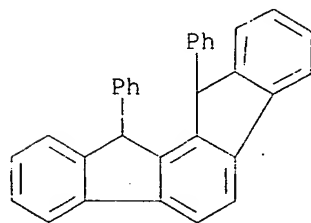
CN Hydroperoxide, (11,12-dihydro-11,12-diphenylindeno[2,1-a]fluoren-11,12-ylene)di- (6CI) (CA INDEX NAME)



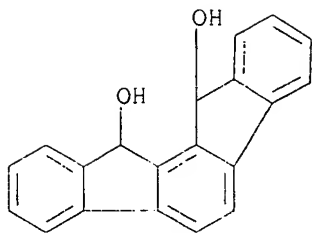
RN 124180-22-9 HCAPLUS
 CN Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-11,12-diphenyl- (CA INDEX NAME)



RN 124180-97-8 HCAPLUS
 CN Indeno[2,1-a]fluorene, 11,12-dihydro-11,12-diphenyl- (CA INDEX NAME)



RN 856642-59-6 HCAPLUS
 CN Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro- (CA INDEX NAME)



L96 ANSWER 15 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1957:39173 HCAPLUS

DN 51:39173

OREF 51:7334h-i,7335a-d

TI Indenofluorene o-quinoid hydrocarbons

AU Etienne, Andre; Le Berre, Andre

SO Compt. rend. (1956); 242, 1493-6

DT Journal

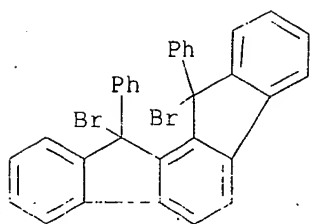
LA Unavailable

AB The reactions of 11,12-diphenylindeno [2,1-a] fluorene (I) and 13,14-diphenylbenz[c]indeno [2,1-a]fluorene (II) were studied to elucidate their structures. Indeno[2,1-a]fluorene-11,12-dione (III) with PhMgBr gave the 2 stereoisomeric 11,12-diphenyl-11,12-dihydroxy-11,12-dihydroindeno [2,1-a]fluorenes (IV), colorless rods, m. 224° (chiefly), and 276°, and a small amount of 11-phenyl-11-hydroxyindeno[2,1-a]fluorene-12-one, yellow-orange rods, m. 227°, separable by chromatography on alumina. Reduction of IV with KIHOAc gave the 2 stereoisomeric 11,12-diphenyl-11,12-dihydroindeno [2,1-a]fluorenes (V), colorless prisms, m. 266°, and colorless needles, m. 330°, separable by differential solubility in HOAc. HBr-HOAc and IV gave 1 stereochem. form of 11,12-diphenyl-11,12-dibromo-11,12-dihydroindeno[2,1-a]-fluorene (VI), yellow prisms, m. 263-6°, hydrolyzed in boiling dioxane-H₂O to a mixture of IV, reducible with ZnHOAc to isomers m. higher than V and a notable amount of the corresponding diacetate, colorless prisms, m. 310°. VI with specially prepared Cu [Piccard, Helv. Chim. Acta 5, 147 (1922)] in boiling C₆H₆ in the absence of air gave I, violet-black crystals, m. 240-51° (from C₆H₆, under an inert atmospheric), not paramagnetic and existing as the o-quinoid rather than

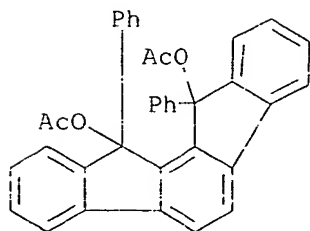
the diradical form. Crystalline I is stable in air, but only without air in solution, is not affected by radiation or light in Et₂O or C₆H₆, is brominated when cold to IV, and forms with maleic anhydride the 11,12-adduct, colorless prisms, m. 315°, reduced to isomers of I by Zn in HOAc while KOH in EtOH gives 1 isomer below the m.p. From previous work (C.A. 49, 12418i) benz[c]indeno[2,1-a]fluorene-13,14-dione (VII) treated with PhMgBr gave the 2-stereoisomeric 13,14-diphenyl-13,14-dihydroxybenz[c]inden[2,1-a]fluorenes (VIII), colorless rods, m. 300°, and colorless prisms, m. 348°, with some mono-Ph by-product, red rods, m. 290°. VIII with HBr in HOAc gave 13,14-dibromo-13,14-diphenylbenz[c]indeno [2,1-a]fluorene (IX), yellow prisms, m. 254-6°. Hydrolysis of IX gave VII above the fusion temperature and reduction with Zn in HOAc yielded the 2 stereoisomeric 13,14-dihydro-13,14-diphenylbenz [c]indeno [2,1-a] fluorenes (X), colorless needles m. 294°, and colorless rods, m. 282°, separable by chromatography, also obtainable from KI in HOAc and VIII. II can be obtained as a green solution in the absence of air from IX with Cu in C₆H₆; it gives the maleic anhydride adduct, m. 370°, and is considered to be very unstable because of the large number of conjugated

double bonds present in the mol.

CC 10 (Organic Chemistry)
 IT 119925-92-7P, Benz[c]indeno[2,1-a]fluoren-13(14H)-one,
 14-hydroxy-14-phenyl- 120267-44-9P, Indeno[2,1-a]fluorene,
 11,12-diphenyl- 120267-45-0P, Indeno[2,1-a]fluorene,
 11,12-dibromo-11,12-dihydro-11,12-diphenyl- 121815-01-8P,
 Benz[c]indeno[2,1-a]fluorene, 13,14-dihydro-13,14-diphenyl-, stereoisomers
 121967-72-4P, Indeno[2,1-a]fluorene-11,12-diol,
 11,12-dihydro-11,12-diphenyl-, diacetate 122273-24-9P,
 Benz[a]indeno[1,2,3-fg]aceanthrylene-9,10-dicarboxylic anhydride,
 8b,9,10,10a-tetrahydro-8b,10a-diphenyl- 124289-38-9P,
 Benz[c]indeno[2,1-a]fluorene-13,14-diol, 13,14-dihydro-13,14-diphenyl-,
 stereoisomers 124290-45-5P, Indeno[1,2,3-cd]fluoranthene-5,6-
 dicarboxylic anhydride, 4b,5,6,6a-tetrahydro-4b,6a-diphenyl-
 124513-91-3P, Benz[c]indeno[2,1-a]fluorene, 13,14-dibromo-13,14-dihydro-
 13,14-diphenyl- 125614-11-1P, Benz[c]indeno[2,1-a]fluorene,
 13,14-diphenyl- 876504-70-0P, Indeno[2,1-a]fluoren-11(12H)-one,
 12-hydroxy-12-phenyl-
 RL: PREP (Preparation)
 (preparation of)
 IT 124180-22-9, Indeno[2,1-a]fluorene-11,12-diol,
 11,12-dihydro-11,12-diphenyl- 124180-97-8, Indeno[2,1-
 a]fluorene, 11,12-dihydro-11,12-diphenyl-
 (stereoisomers)
 IT 120267-45-0P, Indeno[2,1-a]fluorene, 11,12-dibromo-11,12-dihydro-
 11,12-diphenyl- 121967-72-4P, Indeno[2,1-a]fluorene-11,12-diol,
 11,12-dihydro-11,12-diphenyl-, diacetate 876504-70-0P,
 Indeno[2,1-a]fluoren-11(12H)-one, 12-hydroxy-12-phenyl-
 RL: PREP (Preparation)
 (preparation of)
 RN 120267-45-0 HCAPLUS
 CN Indeno[2,1-a]fluorene, 11,12-dibromo-11,12-dihydro-11,12-diphenyl- (CA
 INDEX NAME)

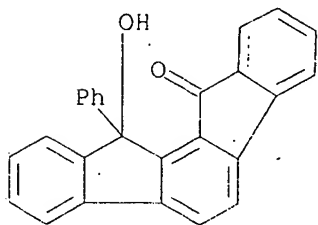


RN 121967-72-4 HCAPLUS
 CN Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-11,12-diphenyl-, diacetate
 (6CI) (CA INDEX NAME)



RN 876504-70-0 HCAPLUS

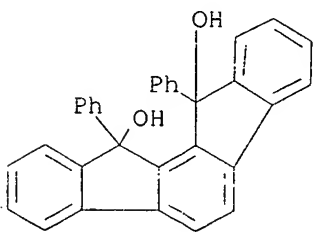
CN Indeno[2,1-a]fluorene-11(12H)-one, 12-hydroxy-12-phenyl- (CA INDEX NAME)



IT 124180-22-9, Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-11,12-diphenyl- 124180-97-8, Indeno[2,1-a]fluorene, 11,12-dihydro-11,12-diphenyl- (stereoisomers)

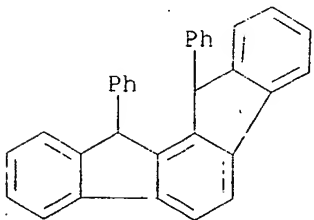
RN 124180-22-9 HCAPLUS

CN Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-11,12-diphenyl- (CA INDEX NAME)



RN 124180-97-8 HCAPLUS

CN Indeno[2,1-a]fluorene, 11,12-dihydro-11,12-diphenyl- (CA INDEX NAME)



L96 ANSWER 16 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1957:1708 HCAPLUS

DN 51:1708

OREF 51:345b-d

TI Dihydroperoxide derivatives of indenofluorene

AU Le Berre, Andre

SO Compt. rend. (1956), 242, 2576-9

DT Journal

LA Unavailable

AB Treatment of 11,12-diphenyl-11,12-dibromo-11,12-dihydroindeno[2,1- α]fluorene (I) with 80% Superoxol in dioxane in the presence of Na₂CO₃ yields 2 isomers of 11,12-diphenyl-11,12-dihydroperoxy-11,12-

dihydroindeno[2,1- α]fluorene (II). The benzo[c] derivative (III) of I yields but one isomer of 13,14-diphenyl-13,14-dihydroperoxy-13,14-dihydrobenzo[c]indeno[2,1- α]fluorene (IV). The major isomer of II seps. with 0.5 mole and the other with 2 moles C₆H₆. The desolvated materials m. 260-2° (decomposition) and 234-6° (decomposition), resp. IV seps. with 0.5 mole ether, m. 180°, or 2 moles Me₂CO, m. 170°; it undergoes decomposition on desolvation. In the presence of Pb(OAc)₄, II is converted to 1-benzoyl-2-(o-hydroxyphenyl)-9-phenyl-9-hydroxyfluorene (V). The mechanism is postulated. IV is converted to the corresponding hydroxyfluorene. II is stable in AcOH, but a trace of HCl or H₂SO₄ converts it to V. In similar circumstances IV resinifies completely. Pyrolysis of II and IV yield, by loss of the peroxide O, the corresponding diols in 35% yield; these m. 276° (decomposition) and 348° (decomposition), resp.

CC 10 (Organic Chemistry)

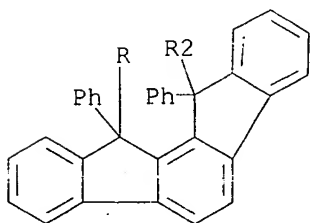
IT **124145-09-1**, Hydroperoxide, (11,12-dihydro-11,12-diphenylindeno[2,1- α]fluoren-11,12-ylene)di- (isomers)

IT 103267-02-3P, Ketone, 9-hydroxy-2-(o-hydroxyphenyl)-9-phenylfluoren-1-yl phenyl **124180-22-9P**, Indeno[2,1- α]fluorene-11,12-diol, 11,12-dihydro-11,12-diphenyl- 124269-74-5P, Hydroperoxide, (13,14-dihydro-13,14-diphenylbenz[c]indeno[2,1- α]fluoren-13,14-ylene)di- 124289-38-9P, Benz[c]indeno[2,1- α]fluorene-13,14-diol, 13,14-dihydro-13,14-diphenyl- 124514-15-4P, Ketone, 7-hydroxy-5-(o-hydroxyphenyl)-7-phenyl-7H-benzo[c]fluoren-6-yl phenyl
RL: PREP (Preparation)
(preparation of)

IT **124145-09-1**, Hydroperoxide, (11,12-dihydro-11,12-diphenylindeno[2,1- α]fluoren-11,12-ylene)di- (isomers)

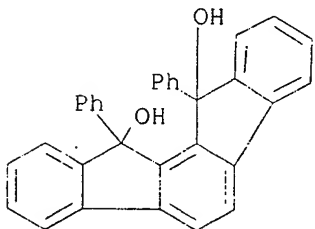
RN 124145-09-1 HCAPLUS

CN Hydroperoxide, (11,12-dihydro-11,12-diphenylindeno[2,1- α]fluoren-11,12-ylene)di- (6CI) (CA INDEX NAME)



IT **124180-22-9P**, Indeno[2,1- α]fluorene-11,12-diol, 11,12-dihydro-11,12-diphenyl-
RL: PREP (Preparation)

(preparation of)
 RN 124180-22-9 HCAPLUS
 CN Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-11,12-diphenyl- (CA INDEX NAME)



L96 ANSWER 17 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1956:73861 HCAPLUS

DN 50:73861

OREF 50:13857d-g

TI Orthoquinoidal indenofluorene hydrocarbons. Their autoxidation in neutral mediums

AU Etienne, Andre; Le Berre, Andre

SO Compt. rend. (1956), 242, 1899-1901

DT Journal

LA Unavailable

AB The behavior of 11,12-diphenylindeno[2,1-a]fluorene (I) and 13,14-diphenylbenz[c]indeno[2,1-a]fluorene (II) toward O has been studied. A dark violet solution of I in C₆H₆, CS₂, or Et₂O reacted with O in the absence of light to give an orange brown solution which on evaporation to dryness

gave a yellow resin, very soluble in most organic solvents except alc. and cyclohexane. The resin did not give O on heating although its percentage composition corresponded to that of a cyclic endoperoxide. It liberated iodine from HOAc-KI solution and was postulated to be a complex mixture of **polymerized** peroxides. This autoxidation was not facilitated by light and proceeded only until 1 mole O had been absorbed. The intermediate cyclic peroxide could not be isolated. The autoxidation of I in the presence of antioxidants was also investigated. With o,o'-di-tert-butyl-p-cresol, the same yellow resin was obtained, and with excess hydroquinone or pyrogallol, autoxidation occurred, followed by H addition to yield 11,12-diphenyl-11,12-dihydroxy-11,12-dihydroindeno[2,1-a]fluorene, m. 276° (10% with hydroquinone, 70% with pyrogallol). II behaved similarly to I, its dark green solution being decolorized instantly on exposure to air to give a resin from which 10-15% 13,14-diphenyl-13,14-dihydroxy-13,14-dihydrobenz[c]-indeno[2,1-a]fluorene, m. 348°, was isolated. II presumably also formed an intermediate unstable cyclic peroxide which was more reactive than that from I since no H donor was necessary to form the diol. The autoxidation of I and II differs from that of the acenes in that the acenes require light activation and form peroxides stable enough to be isolated.

CC 10 (Organic Chemistry)

IT 124180-22-9P, Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-11,12-diphenyl- 124289-38-9P, Benz[c]indeno[2,1-a]fluorene-13,14-diol, 13,14-dihydro-13,14-diphenyl-

RL: PREP (Preparation)

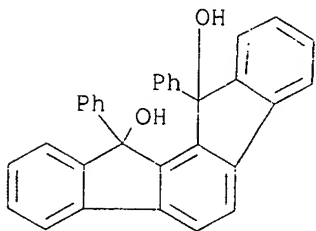
(preparation of)

IT 124180-22-9P, Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-11,12-diphenyl-

RL: PREP (Preparation)
(preparation of)

RN 124180-22-9 HCAPLUS

CN Indeno[2,1-a]fluorene-11,12-diol, 11,12-dihydro-11,12-diphenyl- (CA INDEX NAME)



L96 ANSWER 18 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1952:42288 HCAPLUS

DN 46:42288

OREF 46:7085f-i,7086a-c

TI Fluorenacenes and fluorenaphenes. Syntheses in the indenofluorene series.
II. endo-cis-Fluorenaphene (indeno[2,1-a]fluorene) and trans-fluorenacene (indeno[1,2-b]-fluorene)

AU Deuschel, Werner

CS Univ. Fribourg, Fribourg, Switz.

SO Helvetica Chimica Acta (1951), 34, 2403-16

CODEN: HCACAV; ISSN: 0018-019X

DT Journal

LA German

OS CASREACT 46:42288

GI For diagram(s), see printed CA Issue.

AB cf. C.A. 45, 10224e. A mixture of AlCl_3 and CS_2 are refluxed and the condensed liquid returned through 3,6,1,2- $\text{Ph}_2\text{C}_6\text{H}_2(\text{CO})_2\text{O}$, forming 9-oxo-2-phenyl-1-fluorene-11-carboxylic acid (I), m. 198-200°. I, SOCl_2 , and a little concentrated H_2SO_4 in refluxing CCl_4 form an orange-yellow precipitate of indeno[2,1-a]fluorene-11,12-dione, m. 300° after sublimation at $5 + 10^{-3}$ mm., and 220° (nos. after other m.ps. will be the pressure and temperature of purifying sublimation), which after distillation from Zn at 10 mm. and 360° forms indeno[2,1-a]fluorene (II), m. 286.5-7.5° ($5 + 10^{-3}$ 180°). Cyclohexene, p- $\text{C}_6\text{H}_4\text{Me}_2$, CS_2 , and AlCl_3 form 2,5,1,4-(C_6H_{11}) $2\text{C}_6\text{H}_2\text{Me}_2$ (III), m. 154-5° (10, 150°), which, heated with Se at 340-50° or with 10% Pd-C at 280-90° forms 2,5,1,4- $\text{Ph}_2\text{C}_6\text{H}_2\text{Me}_2$ (IV), m. 182-4° (10, 170°). Chlorination of IV at 185° in an apparatus (diagram given) in which the Cl is produced from KMnO_4 and HCl and the HCl produced recycled to avoid waste of Cl forms 6,6,12,12-tetrachloroindeno[1,2-b]fluorene (V), decompose 330°. V refluxed with PhNO_2 , H_2O , and a little CuCl_2 forms violet-red indeno[1,2-b]fluorene-6,12-dione (VI), m. 345-6° ($5 + 10^{-3}$, 230°); bis(phenylhydrazone), decompose 273-5°. Heating VI, Zn, HOAc, and $\text{C}_5\text{H}_5\text{N}$ forms indeno[1,2-b]fluorene (VII), m. 298-300°, isolated by pouring into 2 N HCl and filtration. Dehydrogenation of IV in a special apparatus (construction details given) in which the vapors of the high-boiling material pass (at 120 mm. and 400°) over 20% Pd-C and are returned within the apparatus itself to be recycled forms VII, m. 300-2° ($5 + 10^{-3}$, 180-90°), identical (mixed m.p.) with the preparation above and giving V on chlorination. An attempt was made to prepare VII via condensation of 2-(phenylethynyl)indene (VIII) with maleic acid to the

compound (IX) or with EtO₂CCH₂CHO to the compound (X), both of which should give VII by reactions similar to those used in the preparation of II. VIII, m. 98-100° (5 + 10⁻³, 95°), was obtained from 2-indanone and PhC.tplbond.CMgBr or PhC.tplbond.CLi and dehydration of the intermediate alc., m. 86.5-7.5° (5 + 10⁻³, 80°), with p-MeC₆H₄SO₃H. But the condensations either did not take place or went to polymeric glassy masses. Attempts to prepare VIII from PhC.tplbond.CNa and 2-bromo-1-indanol were not successful. Oxidation of III is very difficult. CrO₃ in Ac₂O, followed by KMnO₄, gave a small amount of acid, decompose 250-60°, which with warm concentrated H₂SO₄ gave a violet precipitate, VI(?). The acid was desired to check the synthesis by decarboxylating to p-C₆H₄Ph₂.

CC 10 (Organic Chemistry)

IT 486-52-2P, Indeno[1,2-b]fluorene, 6,12-dihydro- 3074-14-4P,
Indeno[2,1-a]fluorene-11,12-dione 4516-08-9P, p-Xylene,
2,5-dicyclohexyl- 5695-13-6P, Indeno[1,2-b]fluorene-6,12-dione
5815-59-8P, Indeno[2,1-a]fluorene, 11,12-dihydro- 20260-22-4P,
p-Terphenyl, 2',5'-dimethyl- 102184-79-2P, 1-Fluorene-carboxylic acid,
9-oxo-2-phenyl- 119682-10-9P, Indeno[1,2-b]fluorene-6,12-dione,
bis(phenylhydrazone) 408313-70-2P, Indeno[1,2-b]fluorene,
6,6,12,12-tetrachloro-6,12-dihydro-

RL: PREP (Preparation)

(preparation of)

IT 3074-14-4P, Indeno[2,1-a]fluorene-11,12-dione 5815-59-8P

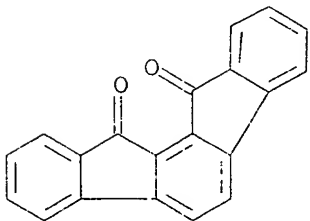
, Indeno[2,1-a]fluorene, 11,12-dihydro-

RL: PREP (Preparation)

(preparation of)

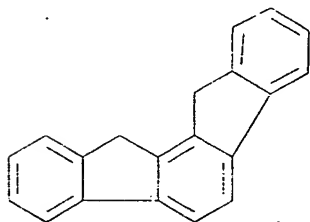
RN 3074-14-4 HCAPLUS

CN Indeno[2,1-a]fluorene-11,12-dione (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



RN 5815-59-8 HCAPLUS

CN Indeno[2,1-a]fluorene, 11,12-dihydro- (CA INDEX NAME)



L96 ANSWER 19 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1939:29837 HCAPLUS

DN 33:29837

OREF 33:4232c-i,4233a-c

TI Phenylated phthalic acids and anthracene derivatives
 AU Weizmann, Ch.; Bergmann, Ernst; Haskelberg, L.
 SO Journal of the Chemical Society (1939) 391-7
 CODEN: JCSOA9; ISSN: 0368-1769
 DT Journal
 LA Unavailable
 OS CASREACT 33:29837
 AB 3,6-Diphenyltetrahydrophthalic anhydride and S, heated at 260-70° for 20 min., give a nearly quant. yield of 3,6-diphenylphthalic anhydride (I), m. 224°; solution in Na₂CO₃ and acidification give the free acid, m. 162° (decomposition), whose Me ester m. 188°. I and PhMgBr in xylene give 50% of 2-benzoyl-3,6-di-phenylbenzoic acid (II), m. 167° (concentrated H₂SO₄ gives a dark green color); α-C₁₀H₇MgBr gives 50% of the 2-α-naphthoyl homolog of II, m. 188°; p-MeOC₆H₄MgBr gives the 2-p-methoxybenzoyl homolog, with 2 mol of H₂O, decomps. 125° and then m. 175° (Me ester, m. 185°), gives with concentrated H₂SO₄ a brown-violet color; 2-(6'-methoxy-β-naphthoyl) homolog, m. 220° (Me ester, 220°), gives with H₂SO₄ a dark green color; 2-p-bromobenzoyl homolog, m. 200° (intense green color with H₂SO₄). Cyclization of the keto acids proved very tedious; the presence of the voluminous o-substituents slows down the ring closure so that side reactions may prevail; e. g., sulfonation readily takes place with H₂SO₄ as the cyclizing agent. I (10 g.) and 5 g. CO(NH₂)₂, heated 2 h. at 200°, give 8.2 g. of 3,6-diphenylphthalimide (III), m. 245°; this could not be degraded to an NH₂ acid by NaOCl or NaOBr. I and NH₂OH in absolute EtOH, allowed to stand 30 h. at room temperature, give a quant. yield of the N-HO derivative of III, m. 238°; heating with dilute NaOH for 12 h. at 100° gives 96% of 3,6-diphenylanthranilic acid, m. 200° (decomposition); Me ester, m. 119-20°; Ac derivative, m. 215°; the acid does not react with ClCH₂CO₂H, BrCH₂CO₂H, HCHO or KCN and therefore the synthesis of tetraphenylindigotin could not be effected. I (6 g.) and AlCl₃ in C₆H₆, boiled 2 h., give 4.5 g. of 2-Phenylfluorenone-1-carboxylic acid (IV), m. 199-201° (concentrated H₂SO₄ gives a red color); phenylhydrazone, yellow, m. 177°; Me ester (V), yellow, m. 142°. V (3.1 g.) and PhMgBr give 1 g. of 1-benzoyl-2-phenylfluorenone (VI), m. 236° (concentrated H₂SO₄ gives a violet-red color). V (3.1 g.) and PhLi after 24 h. give 2 g. of 1-hydroxybenzohydril-2,9-diphenylfluorenone, m. 123° (decomposition), and 1 g. of VI. Decarboxylation of IV with Cu bronze in boiling quinoline gives 2-phenylfluorenone, golden, m. 140-1° (H₂SO₄ gives a deep red solution); phenylhydrazone, brown, m. 168°. Boiling IV with SOCl₂ in CCl₄ for 4 h. gives 1'-ketoindeno(2',3',1,2)fluorenone, golden-red, m. 298°; bisphenylhydrazone, brown, m. 215° (decomposition). 3-PhC₆H₃(CO)₂O (prepared from the tetrahydro derivative and S at 280° for 3 h.) and PhMgBr give a mixture of 2-benzoyl-3-phenylbenzoic acid, m. 172°, and the 6-benzoyl-2-Ph isomer, m. 163°. 1-Phenylanthraquinone (VII) and PhMgBr give 9,10-dihydroxy-1,9,10-triphenyl-9,10-dihydroanthracene, m. 238° (dark blue color reaction with concentrated H₂SO₄). Reduction of VII with Zn in NaOH-NH₄OH gives 1-phenylanthracene, yellow, m. 123°. 1-Phenylbutadiene and C₆H₄O₂, boiled in xylene for 6 h., give a mixture, separated by AcOH, of 1,5-diphenyl-1,4,5,8,11,12,13,14-octahydroanthraquinone (VIII), m. 230°, and 5-phenyl-5,8,9,10-tetrahydro-α-naphthaquinone, m. 170° (blood-red color with concentrated H₂SO₄). Passing air through VIII in 15% EtOH-KOH gives 1,5-diphenylanthraquinone, m. 355°. 1,4-Diphenylbutadiene (IX) and C₆H₄O₂, heated under slightly reduced pressure until a violent reaction sets in and kept at that temperature for 5 h., give 1,4,5,8-tetraphenylanthraquinone, m. 355°; PhLi in Et₂O (24 h.) gives 9,10-dihydroxy-1,4,5,8,9,10-

hexaphenyl-9,10-dihydroanthracene, m. above 370°, very slightly soluble IX and α -naphthaquinone, heated 10 h. at 160°, give 1,4-diphenylanthraquinone (X), yellow, m. 212°; di-NO₂ compound, m. 208°; H₂SO₄ at 100° gives a disulfonic acid, isolated as the Na salt (with 3 mol of H₂O); Br at room temperature gives a di-Br derivative, yellow, m. 295°, whereas at 60° there is formed a tetra-Br derivative, red, m. above 300°. Reduction of X with Zn in NaOHNH₄OH gives a mixture of 1,4-diphenylanthracene, yellow, m. 170° (picrate, brown, m. 173°), and 9-hydroxy-1,4-diphenyl-9,10-dihydroanthracene, m. 155°. X and PhMgBr give 9,10-dihydroxy-1,4,9,10-tetraphenyl-9,10-dihydroanthracene, m. 240°; dehydration with HCO₂H or AcCl gives a hydrocarbon (XI), C₃₈H₂₆, m. 322°; reduction with KI and Na₂S₂O₄ gives a mixture of XI and 1,4,9,10-tetraphenylanthracene, yellow, m. 205°; boiling with HCO₂H gives XI.

CC 10 (Organic Chemistry)

IT 1162-64-7P, p-Terphenyl-2',3'-dicarboxylic anhydride 1162-64-7P, Phthalic anhydride, 3,6-diphenyl- 1169-58-0P, p-Terphenyl-2',3'-dicarboxylic acid, dimethyl ester 1169-58-0P, Phthalic acid, 3,6-diphenyl-, dimethyl ester 1714-09-6P, Anthracene, 1-phenyl- 1714-16-5P, Anthracene, 1,4-diphenyl- 1714-23-4P, Anthracene, 1,4,9,10-tetraphenyl- 3074-14-4P, Indeno[2,1-a]fluorene-11,12-dione 3096-49-9P, 9-Fluorenone, 2-phenyl- 19799-46-3P, p-Terphenyl-2',3'-dicarboxylic acid 19799-46-3P, Phthalic acid, 3,6-diphenyl- 24024-98-4P, 2-Biphenylcarboxylic acid, 3-benzoyl- 75312-13-9P, Anthraquinone, 1,5-diphenyl- 97692-17-6P, Anthraquinone, 1,4,5,8-tetraphenyl- 108842-67-7P, 1,4-Naphthoquinone, 4a,5,8,8a-tetrahydro-5-phenyl- 412025-97-9P, p-Terphenyl-2'-carboxylic acid, 3'-benzoyl- 412297-69-9P, p-Terphenyl-2',3'-dicarboximide, N-hydroxy- 412297-69-9P, Phthalimide, N-hydroxy-3,6-diphenyl- 419567-61-6P, Anthraquinone, 1,4,4a,5,8,8a,9a,10a-octahydro-1,5-diphenyl- 854396-36-4P, Dibenzo[c,lm]fluorene, 8,12b-dihydro-7,8,12b-triphenyl- 855254-49-8P, 3-Biphenylcarboxylic acid, 2-benzoyl- 857588-46-6P, 9-Anthrol, 9,10-dihydro-1,4-diphenyl- 857589-44-7P, Anthranilic acid, N-acetyl-3,6-diphenyl- 857589-44-7P, p-Terphenyl-2'-carboxylic acid, 3'-acetamido- 857589-54-9P, Anthracene, 9,10-dihydro-9,10-dimethoxy-1,4,9,10-tetraphenyl- 857589-97-0P, 9,10-Anthradiol, 9,10-dihydro-1,9,10-triphenyl- 858799-55-0P, 9-Fluorenone, 2-phenyl-, phenylhydrazine 858799-77-6P, 9-Fluorenone, 1-benzoyl-2-phenyl- 858800-06-3P, 1-Fluorenenemethanol, 9-hydroxy- $\alpha,\alpha,2,9$ -tetraphenyl- 860242-54-2P, p-Terphenyl-2'-carboxylic acid, 3'-anisoyl-, Me ester 860242-63-3P, p-Terphenyl-2'-carboxylic acid, 3'-anisoyl- 860242-71-3P, p-Terphenyl-2'-carboxylic acid, 3'-amino- 860242-71-3P, Anthranilic acid, 3,6-diphenyl- 860248-80-2P, p-Terphenyl-2'-carboxylic acid, 3'-(1-naphthoyl)- 860248-88-0P, p-Terphenyl-2'-carboxylic acid, 3'-(6-methoxy-2-naphthoyl)-, Me ester 860248-95-9P, p-Terphenyl-2'-carboxylic acid, 3'-(6-methoxy-2-naphthoyl)- 860249-20-3P, p-Terphenyl-2'-carboxylic acid, 3'-(p-bromobenzoyl)- 860530-81-0P, Anthranilic acid, 3,6-diphenyl-, Me ester 860530-85-4P, 9,10-Anthradiol, 9,10-dihydro-1,4,9,10-tetraphenyl- 860530-88-7P, 9,10-Anthradiol, 9,10-dihydro-1,4,5,8,9,10-hexaphenyl- 860531-64-2P, Anthracene, 1,4-diphenyl-, picrate 861018-66-8P, Phthalimide, 3,6-diphenyl-

RL: PREP (Preparation)

(preparation of)

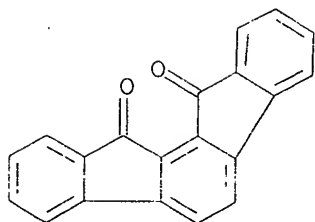
IT 3074-14-4P, Indeno[2,1-a]fluorene-11,12-dione

RL: PREP (Preparation)

(preparation of)

RN 3074-14-4 HCAPLUS

CN Indeno[2,1-a]fluorene-11,12-dione (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



L96 ANSWER 20 OF 20 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1935:13987 HCAPLUS

DN 29:13987

OREF 29:17991,1800a-f

TI Highly arylated aromatic compounds. III. Highly phenylated benzenecarboxylic acids and their transformation products

AU Dilthey, W.; Thewalt, I.; Trosken, O.

SO Berichte der Deutschen Chemischen Gesellschaft [Abteilung] B: Abhandlungen (1934), 67B, 1959-64

CODEN: BDCBAD; ISSN: 0365-9488

DT Journal

LA Unavailable

AB cf. C. A. 28, 3733.7; Allen and Sheps, C. A. 29, 142.1.

endo-Carbonyltetraphenyldihydrophthalic anhydride (I), m. 223° (C. A. 28, 4728), is obtained in 12 g. yield from 12 g. finely powdered tetraphenylcyclopentadienone (called tetracyclone for short) slowly added to 3 g. maleic anhydride in 100 cc. benzene and boiled 7 hrs. If PhCl (b. 132°) is used as the solvent instead of benzene, there is obtained 10-11 g. of tetraphenyldibydrophthalic anhydride (II), m. 243°, also obtained from I boiled in PhCl. In PhNO₂, instead of benzene or PhCl the product is tetraphenylphthalic anhydride (III) (9 g.), m. 295° (occasionally 286°) after driving off the benzene of crystallization; the phthalic acid (IV), from III with boiling alc. KOH, m. 286°. III is conveniently prepared (35 g. yield) by slowly stirring 48 g. II into 150 g. molten S at 250° and slowly raising the temperature to 300° and keeping it at that point 2 hrs. I, II and III can also be prepared without solvents but the temps. must be carefully controlled. The accumulation of Ph groups in IV markedly decreases the reactivity of the CO₂H groups. IV still forms salts but it is practically no longer soluble in aqueous NH₄OH and yields no Et ester by the ordinary methods. Its esters are readily obtained, however, by addition of the corresponding acetylenedicarboxylates to tetracyclone. Thus, the di-Me ester, m. 258°, is obtained in 5.2 g. yield from 5 g. tetracyclone and 2.5 g. (.tpltbond. CCO₂Me)₂ cautiously heated to 160° (this ester is also obtained quant. from IV and CH₂N₂ in MeOH-Et₂O); di-Et ester (10 g. from 3.4 g. (.tpltbond. CCO₂Et)₂), m. 205-6° (A. and S. give 187-8°), cannot be saponified III (1 g.), heated 10 min. in benzene with 0.8 g. AlCl₃, gives 0.7 g. triphenylfluorenonecarboxylic acid, lemon-yellow, m. 322°, converted back into IV by fusion with alkali; K salt, lemon-yellow, m. around 370°; oxime, pale yellow, m. 300°. Boiled 2 hrs. in benzene with 3 g. AlCl₃, 2 g. III yields 1.8 g. diphenyldifluorenone, orange, m. 396°, also obtained from III and fused ZnCl₂ if too high heating is avoided, from III allowed to stand in concentrated H₂SO₄, and from III with PCl₅; dioxime, deep orange-red, carbonizes before it melts. Me pentaphenylbenzoate (6.2 g. from 2 g. PhC .tpltbond. CCO₂Me and tetracyclone at 170-5°, or from Ph₅C₆CO₂H and CH₂N₂ in C₆H₆MeOH), m. 342°, cannot be saponified Tetraphenylfluorenone (3 g. from 4 g. Ph₅C₆CO₂H with POCl₃-PCl₅ on the water bath), yellow, m. 298°, shows brownish yellow halochromism in hot concentrated H₂SO₄. Et

tetraphenyl-o-toluate (2.2 g. from 1.5g. MeC.tplbond.CCO2Et and tetracyclone at 200°), m. 205°; free acid, similarly obtained from MeC.tplbond.CCO2H, m. 302°.

CC 10 (Organic Chemistry)

IT 1487-12-3P, Benzene, 1,2,3,4-tetraphenyl- 2857-85-4P, Benzoic acid, pentaphenyl-, methyl ester 3383-32-2P, Benzene, 1,2,4,5-tetraphenyl- 4741-53-1P, Phthalic anhydride, tetraphenyl- 6583-73-9P, 9-Fluorenone, 1,2,3,4-tetraphenyl- 6971-41-1P, $\Delta^3,5-1,2$ -Cyclohexadienedicarboxylic anhydride, 3,4,5,6-tetraphenyl- **38023-71-1P**, Benzo[1,2-a,4,3-a']diindene-11,12-dione, 5,6-diphenyl- 202828-34-0P, Bicyclo[2.2.1]hept-5-ene-2,3-dicarboxylic anhydride, 7-keto-1,4,5,6-tetraphenyl- 628727-72-0P, o-Toluic acid, 3,4,5,6-tetraphenyl-, ethyl ester 858842-80-5P, o-Toluic acid, 3,4,5,6-tetraphenyl- **860598-76-1P**, Benzo[1,2-a,4,3-a']diindene-11,12-dione, 5,6-diphenyl-, dioxime

RL: PREP (Preparation)

(preparation of)

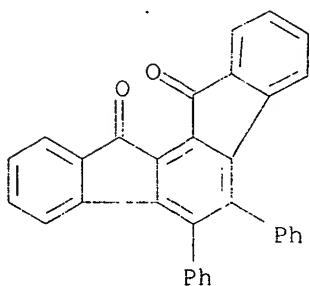
IT **38023-71-1P**, Benzo[1,2-a,4,3-a']diindene-11,12-dione, 5,6-diphenyl- **860598-76-1P**, Benzo[1,2-a,4,3-a']diindene-11,12-dione, 5,6-diphenyl-, dioxime

RL: PREP (Preparation)

(preparation of)

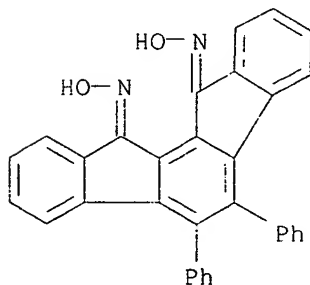
RN 38023-71-1 HCAPLUS

CN Indeno[2,1-a]fluorene-11,12-dione, 5,6-diphenyl- (CA INDEX NAME)



RN 860598-76-1 HCAPLUS

CN Benzo[1,2-a,4,3-a']diindene-11,12-dione, 5,6-diphenyl-, dioxime (3CI) (CA INDEX NAME)



=>

IN THE CLAIMS

Please amend the claims as follows:

1. (Currently amended) A method for manufacturing the imide-substituted polymer polymers comprising the steps of:

copolymerization step done by dividing the feed into the Mixture (A) composed of aromatic vinyl monomers, initiators, and chain transfer agents and the Mixture (B) composed of unsaturated dicarboxylic anhydride monomers and solvents, and then charging copolymerization reactors simultaneously with them while adjusting the flow rate of each mixture according to the compositional ratio of the feed, and finally copolymerizing aromatic vinyl monomers and unsaturated dicarboxylic anhydride monomers in the copolymerization reactors, wherein the mole ratio of the aromatic vinyl monomers to the unsaturated dicarboxylic anhydride monomers is 0.67-6.0:1;

separation step performed by supplying the polymerized solution discharged from the copolymerization reactors into a separator continuously, and then removing unreacted monomers and solvents sufficiently;

imide substitution step accomplished by supplying the polymer melt discharged from the separator continuously into imide substitution reactors and adding continuously the Mixture (C) composed of primary amines, catalysts for an imide substitution reaction, and solvents at the same time, and then reacting unsaturated dicarboxylic anhydride units in said copolymers with the primary amines; and

devolatilization step done by removing low-molecular-weight volatiles from the polymer solution discharged from the imide substitution reactors in ~~the~~ a devolatilizer, wherein the imide-substituted polymer includes 40-55 wt% of aromatic vinyl units, 0-5 wt% of unsaturated dicarboxylic anhydride units, and 40-60 wt% of the imidized units from unsaturated dicarboxylic anhydride units and the residence time in the copolymerization step is within the range of 2.0 to 5.0 hours.

2. (Original) The method for manufacturing the imide-substituted polymer according to claim 1, wherein said aromatic vinyl monomer in the Mixture (A) is selected